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Instream Flow Strategies for California

Enviro Control, Inc, Fort Collins, CO

Prepared for

Fish and Wildlife Service, Fort Collins, CO Western Energy and Land Use Team

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Biological Services Program

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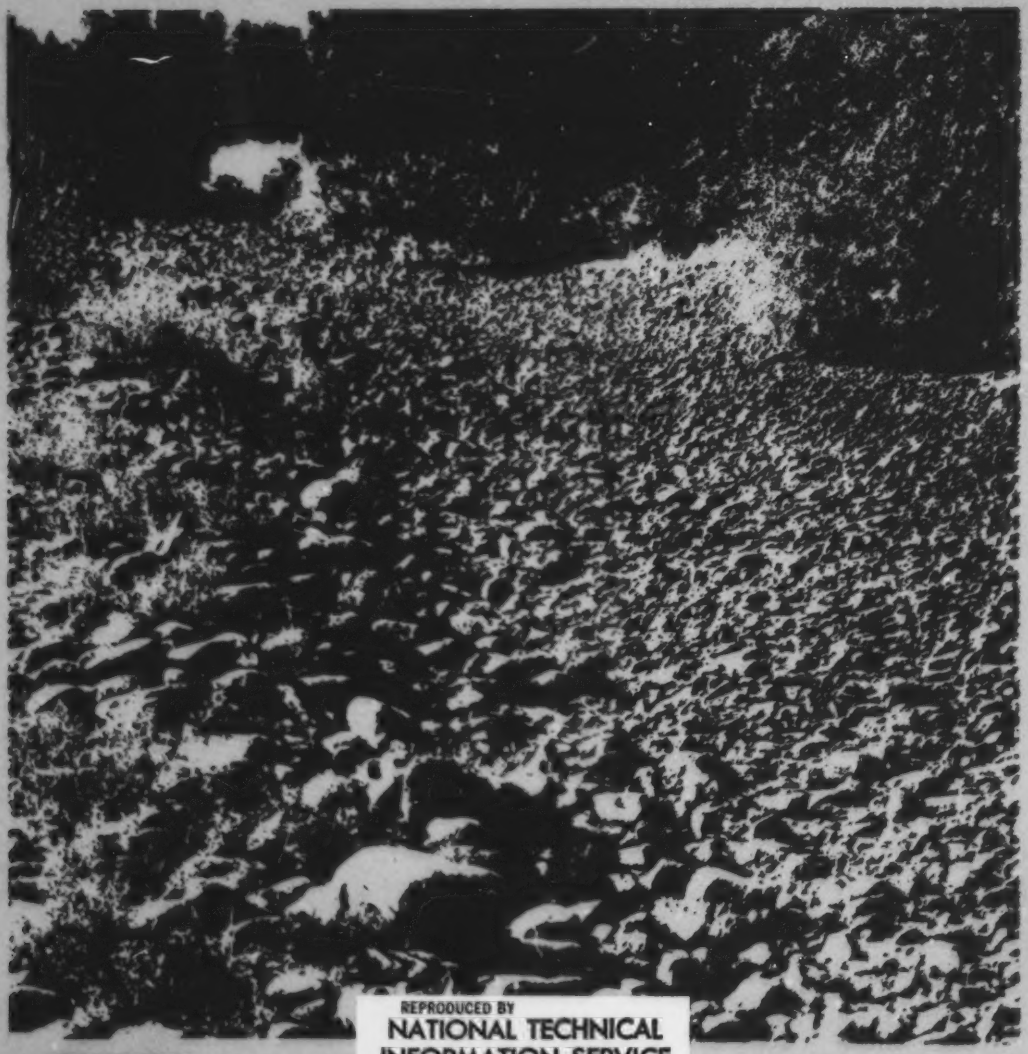
INSTREAM FLOW STRATEGIES FOR CALIFORNIA



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Fish and Wildlife Service

U.S. Department of the Interior

The Biological Services Program was established within the U.S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues which have an impact fish and wildlife resources and their supporting ecosystems. The mission of the Program is as follows:

1. To strengthen the Fish and Wildlife Service in its role as a primary source of information on natural fish and wildlife resources, particularly with respect to environmental impact assessment.

2. To gather, analyze, and present information that will aid decisionmakers in the identification and resolution of problems associated with major land and water use changes.

3. To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

Information developed by the Biological Services Program is intended for use in the planning and decisionmaking process, to prevent or minimize the impact of development on fish and wildlife. Biological Services research activities and technical assistance services are based on an analysis of the issues, the decisionmakers involved and their information needs, and an evaluation of the state-of-the-art to identify information gaps and determine priorities. This is a strategy to assure that the products produced and disseminated will be timely and useful.

Biological Services projects have been initiated in the following areas:

Coal extraction and conversion

Power plants

Geothermal, mineral, and oil shale development

Water resource analysis, including stream alterations and western water allocation

Coastal ecosystems and Outer Continental Shelf development.

Systems and inventory, including National Wetlands Inventory, habitat classification and analysis, and information transfer

The Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning and management; National Teams which provide the Program's central, scientific and technical expertise, and which arrange for contracting of Biological Services studies with States, universities, consulting firms, and others; Regional staff who provide a link to problems at the operating level; and staff at certain Fish and Wildlife Service research facilities who conduct inhouse research studies.

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4. Title and Subtitle Instream Flow Strategies for California			5. Report Date May 1978 6.
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9. Performing Organization Name and Address Enviro Control, Inc. 1520 East Mulberry Street, Fort Collins, CO 80524 and 11300 Rockville Pike, Rockville, MD 20852			10. Project/Task/Work Unit No. WELUT No. 023 11. Contract/Grant No. 14-16-0008-2121
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This is one of 13 reports that identifies and evaluates the most promising institutional methods for reserving instream flows to benefit fish and wildlife in each of 13 western states. The states included in the study are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. Each report has three main sections. First is a guide to help the reader select the most important strategy for any given situation, followed by a summary evaluation of how well the method has worked in the state. The third part is a detailed narrative description of the procedures for implementing the strategy and an example of how it has been employed in the state.

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Instream flow criteria

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INSTREAM FLOW STRATEGIES FOR CALIFORNIA

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Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR

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PREFACE

This report represents the combined efforts of several individuals and firms toward a common objective: the identification, description and preliminary evaluation of the most promising strategies (institutional methods) for reserving instream flows for fish and wildlife under existing laws.

Toward this objective, the U.S. Fish and Wildlife Service, through its Western Water Allocation Project, contracted with two firms. Richard Dewsnup and Dallin Jensen received a contract to identify available strategies under state laws, federal laws, interstate compacts, and water quality laws. From a large number of strategies identified by this contract effort, the most promising ones were selected for further evaluation. A second firm, Enviro Control, Inc., was contracted to evaluate the most promising strategies in depth.

The combined efforts of the two firms were published in several reports which are identified below. Following this initial effort, a separate report for each state was published. This was done in the belief that most persons who are involved in instream flow work are primarily oriented to a single state. The several western states are at different levels in terms of their laws supporting instream flows, their water rights traditions, and their past experiences regarding the reservation of instream flows for fish and wildlife. This is one of the individual state reports.

The report is organized into three sections. These are the information matrix, the evalation matrix, and the narrative description of each strategy. The information matrix is intended to be a guide to help the reader select the strategy or stategies most applicable to any particular situation. This matrix contains a general description of the strategy, the most applicable situations for its use, the party or parties who can initiate the strategy, and the party or parties who must implement the strategy.

The evaluation matrix provides a subjective analysis of whether each strategy has been used to advantage, disadvantage, or not at all in each state. A unique feature of the evaluation matrix is that a blank matrix is provided for the reader. This is done because an evaluation of this kind is necessarily a product of a given time frame and a particular point of view. The blank evaluation matrix will allow the reader to evaluate the strategies as times, laws, experiences, and traditions change in the state.

The narrative section of the report contains an expanded description of each strategy, notes its application possibilities, illustrates the usage of the strategy within the state, and evaluates its general utility. All of the narrative materials are oriented to the particular state for which the report is written.

In the use of this report, the reader should be aware of its purposes and limitations. First, only a few of the many possible strategies are described herein. The user should exercise initiative, judgement, and creativity in dealing with any specific situation. Second, this report should be used as a starting point. In any situation related to the acquisition of instream water rights, legal advice should be sought. This report should in no way be construed as a substitute for the opinion of a private attorney, attorney general, or agency solicitor. Third, this report is neither a policy nor decision document. It is simply a collection of strategies which appear to have utility in a variety of situations.

Further questions about these and other strategies may be addressed to the Cooperative Instream Flow Service Group, U.S. Fish and Wildlife Service, Western Energy and Land Use Team, Drake Creekside Building, 2625 Redwing Road, Fort Collins, Colorado 80526. This Group is an interagency, intergovernmental, interdisciplinary service organization under sponsorship of the U.S. Fish and Wildlife Service, Western Energy and Land Use Team. The Group provides a focal point for the increasing activity of instream flow assessments.

For more detail on the strategies, the user of this report should be aware of supportive documentation contained in several related reports:

1. FWS/OBS-77/26. Strategies for Reserving Flows for Fish and Wildlife: Identifcation, Description and Preliminary Evaluation. By Richard L. Dewsnup and Dallin W. Jensen, February 1977. 706 pages.

   This is the full completion report prepared by Dewsnup and Jensen under the FWS contract. It contains chapters on regulatory authority and property rights in water resources, strategies for reserving instream flows under Federal statutes, strategies for protecting instream flows under State statutes, and interstate compacts as they relate to the protection of instream flows. This report is only available from the National Technical Information Service (NTIS Accession No. PB 276 243).

2. FWS/OBS-77/27. State Laws and Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, March 1977. 76 pages.

   This report is a slightly modified version of the State law chapter taken from the above report. It contains a summary matrix in which the legal basis (e.g., statute in the State code) for each strategy in each State will be identified. This report is also available from the National Technical Information Service (NTIS Accession No. PB 272974).

3. FWS/OBS-77/29. Promising Strategies for Reserving Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, Edward Hoban, Gerald Horak, Martin Lewis, and Wayne Nelson, August 1977. 63 pages.

This report contains descriptions of 26 strategies for reserving instream flows under existing laws. The descriptions provide guidance on the level of action required, legal bases for each strategy, and advantages, disadvantages, and costs involved in strategy implementation. This report is also available from the National Technical Information Service (NTIS Accession No. PB 276 046).

LIST OF ABBREVIATIONS

BLM	Bureau of Land Management
BR	Bureau of Reclamation
CE	Corps of Engineers
DOE	Department of Energy
FERC	Federal Energy Regulatory Commission
FWS	Fish and Wildlife Service
FS	Forest Service
HCRS	Heritage Conservation and Recreation Service
SCS	Soil Conservation Service

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INFORMATION MATRIX

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
APPROPRIATIVE WATER RIGHTS							
State Condemnation and Reallocation of Water Rights	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
State Appropriation of Instream Flows	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
State Moratoria on New Appropriations	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
State Discretionary Water Permit Authority	Utilizing discretionary opportunities by the permit authority for the benefit of instream flows	Granting new water permits or exchanges or transfers of existing rights	Public interest groups; California Department of Fish and Game	Petition the California Water Resources Control Board to deny or amend permit application	California Water Resources Control Board	Deny or amend permit application	Bargaining cost; study cost
LEGISLATIVE AND ADMINISTRATIVE CONTROLS							
Federal Reauthorization of Projects	Reauthorizing existing Federal water resource projects to provide for instream flow reservations	At existing Federal dams or stream diversions	Construction agency; public interest groups; FWS Area Office; (Sacramento); California Department of Fish and Game	Lobby to have construction agency conduct feasibility study; seek Congressional reauthorization	U.S. Congress	Enact legislation reauthorizing the project (approved by Committee, passed by both houses)	Feasibility study cost; bargaining cost; legislative cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State-Federal Wild and Scenic Rivers System	Designating stream segments for inclusion within a wild and scenic rivers system to promote instream flow reservations	Along free-flowing stream segments, bordered by visually appealing landscape	Local citizens; Member of Congress; Member of State Legislature	Organize and demonstrate local support to convince elected representatives to introduce a Bill	U.S. Congress; State Legislature; California Department of Water Resources; Forest Service; Heritage Conservation and Recreation Service; FWS Region 1 Office; California Department of Fish and Game	Pass a Bill authorizing study of the segment(s); conduct study to inventory resource and solicit local views; after agency review, consider study report in Congressional Committee or Legislative Committee and pass a Bill approving designation	Study cost; legislative cost
State Definition of Navigable Waters	Utilizing the definition of navigable waters to preserve instream flows	Along navigable streams	California Department of Fish and Game; another State resource agency	Determine that the stream meets the definition of navigability	California Department of Fish and Game; another State resource agency	Select the best course of action to reserve an instream flow through other State strategies	Study cost; legal costs
State-Federal Interagency Consultation	Adopting interagency agreements, regulations, and formal procedures to implement the Fish and Wildlife Coordination Act toward promoting instream flow reservations	Planning new or expanded Federal water resource projects	FWS Region 1 Office; California Department of Fish and Game; public interest groups	Seek interagency agreements based on adopted regulations or procedures; promote strengthening procedures or see that they are enforced	FWS Region 1 Office; California Department of Fish and Game; construction or permit agency	Draw up agreements or make existing procedures more stringent	Bargaining cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
Federal License and Permit Stipulations	Incorporating stipulations in new and renewed Federal licenses and permits to reserve instream flows	Authorizing planned or existing Federal dams and reservoir projects	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups; private citizens	Determine quantity of flow required; make specific instream flow recommendation to permit or license agency	Permit or license agency (FERC, BLM, FS etc.)	Stipulate flow reservation in permit or license	Study cost; bargaining cost
State Allocation of Reservoir Space	Reserving storage by permit in reservoirs by a State agency for instream releases	Planning new or expanded State water resource projects	California Department of Fish and Game; public interest groups; private citizens	Determine quantity of flow required; make specific storage recommendation to the California Water Resources Control Board and the California Department of Water Resources	California Water Resources Control Board and California Department of Water Resources	Stipulate storage requirements in State water resource project	Study cost; bargaining cost
State Purchase and Lease of Water Rights	Obtaining contractual arrangements which include direct purchase of flow rights, the leasing of water rights, and the purchase of shares in a mutual water company to enhance instream flows	Particularly along overappropriated streams	California Department of Fish and Game; private citizens; public interest groups	Identify stream where the purchase of only a few cfs can make a significant difference to the fishery; locate willing seller, lessor, or mutual shares company	California Department of Fish and Game; private citizens; public interest groups	Purchase or lease water right or purchase shares in a mutual shares company	Acquisition cost; negotiation cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
WATER RESOURCE PLANNING							
Federal Water Resource Council Planning Programs	Considering instream flow needs in Water Resources Council planning programs toward promoting flow reservations	Planning river basin and energy development	California Department of Fish and Game; FWS Cooperative Instream Flow Group; FWS Region 1 Office; public interest groups	Lobby to have instream flows considered in Level B study or Section 13(a) assessment	The Resources Agency of California	Include instream flow requirements in Level B study or Section 13(a) assessment	Study cost
Federal Aid Funding to Purchase Storage	Expending Federal Aid funding to purchase reservoir storage as a means of reserving instream flows	Along overappropriated streams at privately owned reservoirs	California Department of Fish and Game	Identify stream and reservoir; file required documents requesting funds from Region 1 Federal Aid Office	FWS Region 1 Federal Aid Office; California Department of Fish and Game	Grant funds; purchase the water rights	Administrative cost; acquisition cost
Federal Reservoir Construction and Enlargement	Constructing larger new reservoirs or enlarging existing reservoirs to provide for instream flow reservations	At existing or planned Federal reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Conduct stream investigation; recommend a larger dam and reservoir; allocate additional costs to fish and wildlife benefits	Construction agency; U.S. Congress	After possible Congressional authorization, constructs additional storage for instream flows	Study costs; bargaining cost; construction cost legislative cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
WATER RESOURCE MANAGEMENT							
State Water Rights Records Analyzed	Analyzing water rights records as an aid to reserving flows	Bargaining for an instream flow	California Department of Fish and Game; FWS Area Office (Sacramento); public interest groups	Determine the extent, location and ownership of water rights from the California Water Resources Control Board	California Department of Fish and Game; FWS Area Office (Sacramento); public interest groups	Select the best course of action to reserve an instream flow	Water data cost; study cost
State-Federal Flow Requests Made Early	Presenting recommendations early in the decision process to achieve reservation of instream flows	At planned Federal dams and reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Conduct a timely investigation; recommend an instream flow to the construction agency	Construction agency	Include instream flow in project plans	Study cost; gaging installation and maintenance cost; bargaining cost
State-Federal Flow Request Made Specific	Specifying and monitoring instream flow reservations to protect downstream fish and wildlife resources	Along stream reaches below existing or planned Federal dams and reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Conduct detailed instream flow study; recommend flow to the construction and/or permit agency, specifying flow releases and flow quantities required at downstream sites	Construction agency/permit agency	Include flow releases in reservoir's operating criteria; install gaging stations to determine the sufficiency of the actual releases	Study cost; gaging installation and maintenance cost; bargaining cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State-Federal Combined Storage and Flow Requests	Negotiating for reservoir storage to facilitate instream flow reservations	Planning new reservoirs or reallocating storage space in existing Federal reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Request information regarding reservoir storage allocations and projected sales from the construction agency; determine the amount of storage available to ensure minimum instream flows; recommend storage and flow requirements	Construction agency	Allocate storage to fish and wildlife; include flow releases in the reservoir operating criteria	Bargaining cost; study cost
ENGINEERING ALTERNATIVES							
Coordinated Multi-Reservoir Operations	Coordinating operations of multi-reservoir systems to facilitate instream flow reservations	At Federal dams and reservoirs in multi-reservoir system	FWS Area Office (Sacramento); California Department of Fish and Game; FWS Region 1 Office	Conduct system-wide flow study to establish the flows required propose to alter the operations manual and memorandum of agreement to ensure the recommended flows	Agency or agencies operating the system; U.S. Congress	After possible Congressional reauthorization or relicensing, revise the system operations manual to include stream flows	Study cost; bargaining cost; legislative cost

INFORMATION MATRIX

Strategies for Reserving Instream Flows in California

Title	IDENTIFICATION		APPLICATION				
	General Description	Applicable Situations	Initiation		Implementation		
			Parties	Actions	Parties	Actions	Expenditures
Reservoir Sediment Storage Releases	Releasing reservoir sediment storage reserves to promote instream flow reservations	At existing Federal dams and reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Determine the quantity of available yield from the sediment reserve; recommend that the construction or administering agency reassign a portion of this yield to benefit fish and wildlife resources	Construction or administering agency	Modify project operation; release yield from the sediment reserve for instream flows	Study cost; bargaining cost
Stream Channels to Convey Stored Water	Conveying stored water to downstream users via the stream channel to aid in securing instream flow reservations	At planned Federal dams and reservoirs	FWS Area Office (Sacramento); California Department of Fish and Game; public interest groups	Obtain information regarding proposed conveyance systems; determine system's effect on fish and wildlife resources; recommend system modification to the construction agency	Construction agency	Modify conveyance system to preserve fish and wildlife resources	Study cost; re-design cost; bargaining cost

EVALUATION MATRIX

EVALUATION MATRIX Strategies for Reserving Instream Flows in California

yes = Advantage ●
no = Disadvantage ○
blank - Inapplicable (in this State)

	ELEMENTS OF EFFECTIVENESS																						ELEMENTS OF COST					
	Overall		Political			Legal					Administrative						Resource					Institutional			Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?
Appropriative Water Rights																											
State Condemnation/Reallocation of Water Rights																											
State Appropriation of Instream Flow																											
State Moratoria on New Appropriations																											
State Discretionary Water Permit Authority	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	○	●	○	○	○	●	●	○	●	●	●	○
Legislative/Administrative Controls																											
Federal Reauthorization of Projects	○	○	●	○	●	●	○	●	●	●	●	○	○	●	●	○	●	●	●	●	○	○	○	○	●	●	○
State-Federal Wild & Scenic River Systems	●	●	○	○	●	●	○	●	●	●	●	○	○	●	●	○	●	○	●	○	○	○	○	○	●	●	●
State Definition of Navigable Waters	○	○	○	○	●	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	●	●	●	○
State-Federal Interagency Consultation	○	●	●	●	●	●	●	●	●	●	○	●	●	●	○	○	○	○	○	○	○	●	○	●	●	●	○
Federal License & Permit Stipulations	●	●	○	○	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	○	●	○	○	●	●	●
State Allocation of Reservoir Space	●	●	●	○	●	○	●	●	●	○	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●
State Purchase & Lease of Water Rights	○	○	●	●	●	●	●	○	○	●	●	○	●	●	●	○	●	●	●	●	●	●	○	○	●	●	●
Water Resource Planning																											
Federal WRC Planning Programs	○	○	○	○	○	●	●	●	○	○	●	●	●	●	●	●	○	○	○	○	○	●	●	○	●	●	●
Federal Aid Funding to Purchase Storage	○	○	●	●	○	●	●	○	●	○	●	●	●	●	●	○	●	●	●	●	●	●	○	●	○	●	●
Federal Reservoir Construction/Enlargement	○	●	●	○	●	●	○	●	○	○	●	●	●	○	●	●	●	●	●	●	○	●	○	●	○	●	●
Water Resource Management																											
State Water Rights Records Analyzed	○	●	●	●	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	●	●	●	●	●	●	●	●
State-Federal Flow Requests Made Early	●	●	●	○	○	●	●	●	○	○	●	●	●	●	○	○	●	○	●	●	●	●	○	○	●	●	●
State-Federal Flow Requests Made Specific	●	●	●	○	○	●	●	●	○	○	●	●	●	●	○	○	●	○	●	●	●	●	○	○	●	●	●
State-Federal Combined Storage/Flow Requests	○	●	●	○	○	●	●	●	○	○	●	●	●	○	○	○	●	●	●	●	○	●	○	○	●	○	●
Engineering Alternatives																											
Coordinated Multireservoir Operations	●	●	●	○	●	○	●	●	○	○	●	●	○	○	●	○	●	○	●	●	○	●	○	●	●	●	○
Reservoir Sediment Storage Releases	○	○	●	○	●	○	○	●	○	○	●	○	○	○	●	○	○	●	●	●	○	●	○	●	●	●	○
Stream Channels to Convey Stored Water	○	●	●	○	○	○	●	●	○	○	○	○	○	○	●	●	●	○	●	●	○	●	○	●	●	●	●

Answers are strictly judgmental, based on written and verbal opinion reported to the Enviro Control study team through December 1977; subject to modification by selected reviewers (empty matrix furnished for reviewers on the following page).

EVALUATION MATRIX Strategies for Reserving Instream Flows in _____

yes = Advantage ●
no = Disadvantage ○
blank = Inapplicable (in this State)

	ELEMENTS OF EFFECTIVENESS																								ELEMENTS OF COST			
	Overall		Political				Legal						Administrative						Resource						Institutional				Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?	
Appropriative Water Rights																												
State Condemnation/Reallocation of Water Rights																												
State Appropriation of Instream Flow																												
State Moratoria on New Appropriations																												
State Discretionary Water Permit Authority																												
Legislative/Administrative Controls																												
Federal Reauthorization of Projects																												
State-Federal Wild & Scenic River Systems																												
State Definition of Navigable Waters																												
State-Federal Interagency Consultation																												
Federal License & Permit Stipulations																												
State Allocation of Reservoir Space																												
State Purchase & Lease of Water Rights																												
Water Resource Planning																												
Federal WRC Planning Programs																												
Federal Aid Funding to Purchase Storage																												
Federal Reservoir Construction/Enlargement																												
Water Resource Management																												
State Water Rights Records Analyzed																												
State-Federal Flow Requests Made Early																												
State-Federal Flow Requests Made Specific																												
State-Federal Combined Storage/Flow Requests																												
Engineering Alternatives																												
Coordinated Multireservoir Operations																												
Reservoir Sediment Storage Releases																												
Stream Channels to Convey Stored Water																												

APPROPRIATIVE WATER RIGHTS

STATE CONDEMNATION AND REALLOCATION OF WATER RIGHTS

This strategy is presently unavailable in California. The California Department of Fish and Game's limited powers of eminent domain do not extend to the condemnation of existing water rights to preserve instream flows.

Sources

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STATE APPROPRIATION OF INSTREAM FLOW

Two court cases pending in May 1978 illustrate the constraints on appropriating water for instream purposes in California. In 1973, California Trout, Inc. submitted an application to the State Water Resources Control Board for a permit to appropriate 3 cfs in Redwood Creek in Marin County. The application stated the water would remain in the stream "for the preservation and enhancement of the fish and wildlife from which Cal-Trout and its members derive beneficial use." In 1976, the California Department of Fish and Game applied to the Board for a permit to appropriate from 40 to 300 cfs of streamflow from May to October in the Mattole River in Humboldt County. The Department sought to conserve and protect the valuable salmon and steelhead trout fishery in this river. The State Water Resources Control Board rejected both applications on grounds that a diversion or some form of physical control is necessary for a valid appropriation.

Both California Trout, Inc. and the Department of Fish and Game subsequently sought court orders compelling the Board to reconsider and accept their applications. In November 1977, the California Superior Court of Sacramento County ordered the Board to accept the California Trout, Inc. application. In May 1978, the State Water Resources Control Board was appealing this decision to the Third District Court of Appeals. In the other suit, the California Superior Court of Humboldt County refused to require the Board to accept the Department of Fish and Game's application. The Attorney General's office is presently preparing to appeal this decision to the First District Court of Appeals. Only the final outcome of higher court review can establish whether this strategy can be considered available in California.

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STATE MORATOIRA ON NEW APPROPRIATIONS

In California there are no provisions for either statutory or administrative moratoria on new appropriations, and therefore this strategy must be considered unavailable in this State.

Sources

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STATE DISCRETIONARY WATER PERMIT AUTHORITY

I. Identification

This strategy enables the protection of instream flows whenever the California Water Resources Control Board grants new water rights or approves transfers or exchanges. When acting upon a water use application, the Board must consider the recommendation of the California Department of Fish and Game concerning the amount of streamflow needed for the preservation and enhancement of fish and wildlife resources.

The legal basis of this strategy is California Water Code § 1243 which declares that recreation and the preservation and enhancement of fish and wildlife are a beneficial use of water and this beneficial use should be taken into consideration when the Board determines the amount of water available for appropriation for other beneficial uses. In addition, § 1243 requires the Board to notify the Department of Fish and Game of any application for a permit to appropriate, and directs the Department to recommend amounts of water needed for fish and wildlife.

If the Department of Fish and Game fails to make any recommendations, then the Board, pursuant to the California Fish and Game Code § 5937 and 23 California Administrative Code § 762.5 (adopted by the Board in 1975), inserts the following terms in all permits for diversion of water by means of a dam which "do not contain a more specific provision for the protection of fish":

> (T)he permittee ... (must) allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around, or through the dam to keep in good condition any fish that may be planted or exist below the dam ...

The Regulation also provides that:

> In the case of a reservoir, this provision shall not require the passage or release of water at a greater rate than the unimpaired natural inflow into the reservoir.

II. Application

This strategy is applicable when there is an application to the California Water Resources Control Board for a permit to appropriate water or to exchange or transfer a water right. The two most important parties in applying this strategy are the Board and the California Department of Fish and Game.

The Board exercises an important decision-making function in its determination whether to accept the Department of Fish and Game's recommendation. The acceptance of the recommendation would result in the Board adding conditions to the permit or, in extreme cases, rejecting an application, A rejection would be necessary if the Department determines that the survival of the fish or wildlife on a particular stream would be threatened by any further appropriations. The California Department of Fish and Game exercises important decision-making in ascertaining the needs of fish and wildlife

along particular streams and formulating a recommendation to the Board concerning amending or denying applications to appropriate, transfer, or exchange water rights.

In many ways this is a costly strategy, especially for the Department of Fish and Game. The Department must spend tremendous amounts of time and money quantifying the needs of fish and wildlife along numerous streams. In addition, participation in permit procedures is costly and time consuming.

III. Illustration

The American River supports a very significant King Salmon run of approximately 50,000 adults annually as well as a steelhead run, shad and striped bass. In oder to maintain this fishery, the California Department of Fish and Game intervened when the Bureau of Reclamation applied to the State Water Resources Control Board for a permit for the Auburn-Folsom Project.

After conducting field studies, the Department recommended to the State Water Resources Control Board that a minimum release of 1,500 cfs for the downstream fishery be included in the BR's permit. The Board accepted the recommendation and so conditioned the permit. This flow has generally been released and the fishery maintained. Because of the relatively small size of the fishery subject to impact and the Department's other involvements in the Auburn-Folsom Project, the cost of implementing the strategy was minimal.

IV. Evaluation

Undoubtedly, this strategy has been one of the most frequently applied and successful in California for reserving instream flows. According to Department of Fish and Game personnel, 70 to 80% of the applications filed are protested. Also, they report that virtually all Departmental recommendations have been included in protested water permits in recent years. The prime advantage of this strategy is that theoretically it can be utilized along every stream in California whenever a new appropriation occurs. Another advantage is the firm legal basis of the strategy and its full incorporation into State decision making.

There are, however, some potentially serious constraints on implementing this strategy. First, the State Water Resources Control Board does not have to continue accepting the recommendations of the California Department of Fish and Game when granting permits. Also, the strategy is sometimes quite costly. Both the research involved in formulating recommendations and participation in the permit process may consume substantial time and staff effort. However, these costs may be reduced when the strategy is applied where a construction agency is proposing or constructing a new or modified water resource project. In this instance, the construction agency probably is funding the California Department of Fish and Game to conduct studies, as illustrated by the Auburn-Folsom Project. Furthermore, Department personnel have stated that the Department should embark upon a costly program to survey the more significant streams throughout the State of California, ascertaining the minimum instream flows required to preserve the existing fishery resources, and then file applications to appropriate these

streamflows for that beneficial use. Such a comprehensive approach would better ensure the continued success of this strategy into the future.

Since its adoption in 1975, the provisions of California Admin. Code § 762.5 have never had to be incorporated into water permits for diversions by means of a dam. The Department of Fish and Game indicates that it has always been able to review water permit applications and make acceptable and binding recommendations where necessary; the Department, however, perceives the possibility of some future difficulty in continuing to do so. If, the Department ever fails to succeed with its recommendations, then the Board would incorporate the standard permit clause as provided by Regulation 762.5. Both the Department and the Board recognize a shortcoming of the Regulation; its language, such as the term "sufficient water", is too imprecise, allowing for broad interpretation of its intent. Therefore, lengthy and costly administrative hearings and court suits could result if protests or challenges questioning the permittee's compliance with this vague regulation are submitted to the Board subsequent to granting a permit. The successful outcome of any such protests might be assured only where the permittee has failed to provide for any bypass flows at the dam.

Perhaps the biggest possible constraint on this strategy's future effectiveness is that it may be construed as not applying to Federal reservoirs. The Department of Fish and Game has frequently used the "protect procedure" to intervene and convince the State Water Resources Control Board to attach permit conditions applying to Federal reservoirs. However, a recent court decision decided in 1975 (United States v. California) held that the State of California no longer had the right to condition permits for water use involving Federal reservoirs. This decision was appealed and in 1977 the decision was upheld. The strategy is further constrained because the use of permit and license conditions provides little consistent protection to fish and wildlife throughout a major stream reach. Each Department of Fish and Game stipulation in a permit protects only a limited stream segment. If the Department in the future is unsuccessful in defending against a single challenge of a permit condition, the result could be the destruction of stream resources because minimum bypass flows are necessary at every structure throughout the protected stream reach.

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LEGISLATIVE AND ADMINISTRATIVE CONTROLS

FEDERAL REAUTHORIZATION OF PROJECTS

I. Identification

Reauthorization of a Federal water resource project to provide for increased flow releases so as to reserve instream flows involves Congressional passage of legislation modifying the original authorizing legislation. After the sponsoring construction agency conducts feasibility studies, which include comments of the Fish and Wildlife Service, the appropriate Congressional Committee drafts new legislation or amends the original authorizing legislation. The legal basis of this strategy is the Congressional authorization process for water resource projects and construction agency guidelines and procedures for authorizing and modifying water resource projects.

II. Application

This strategy may be pursued when the reauthorization of a water resource project could rehabilitate or markedly improve the downstream fishery. Interest groups of fishermen or conservationists might instigate this strategy; the Fish and Wildlife Service or California Department of Fish and Game might also. A U.S. Senator or Representative could introduce reauthorizing legislation. Realistically, however, for this strategy to be successful, a construction agency such as the Bureau of Reclamation or Corps of Engineers must initiate the process by agreeing to study reauthorization and support it before Congress.

There is a number of important decision points in the formulation and implementation of this strategy. Those encouraging the strategy must decide to lobby the construction agency for action. The construction agency must decide whether to support a study of reauthorization. Once a study is completed, the construction agency may decide to modify the project and, if so, must also decide whether to seek Congressional reauthorization. If the modification is minor, the construction agency has the discretionary authority to alter project operations without Congressional approval. In instances involving instream flows, however, the construction agency would probably seek Congressional approval because of the normally controversial nature of such a modification. To secure the approval of Congress, the construction agency would conduct and submit a feasibility study justifying the proposed change.

Legislation reauthorizing a Bureau of Reclamation project must be approved by the Subcommittee on Water and Power Resources of the House Committee on Interior and Insular Affairs and by the Subcommittee on Public Lands and Resources of the Senate Committee on Energy and Natural Resources. Corps of Engineers projects must be approved by the Subcommittee on Water Resources of the House Public Works Committee and by the Subcommittee on Water Resources of the Senate Committee on Environment and Public Works. After reviewing the feasibility report of the construction agency, these committees must decide whether to reauthorize. According to Congressional staff members, as long as there is no significant political opposition the committees will approve the reauthorizing legislation. The legislation must then be approved by both houses of Congress and signed by the President.

This strategy is costly in terms of money and time. The construction agency and fish and wildlife agencies must fund and conduct a feasibility study to justify the modification and reauthorization of a project already planned and constructed. The reauthorization process takes almost as long--5 to 10 years--as the original authorizing process.

III. Illustration

This strategy has not been implemented in California; therefore, an illustration from Wyoming was chosen to demonstrate the utility of this strategy. Kortes Unit, a component of the Missouri River Basin Project in Wyoming, was reauthorized for fishery conservation in 1971 by the passage of P.L. 92-146. Specifically, the Secretary of the Interior was instructed to maintain a minimum streamflow of 500 cfs in the reach of the North Platte River between Kortes Dam and the normal headwaters of Pathfinder Reservoir. However, when water sufficient to operate the unit in this manner is not available, water must be reserved for hydroelectric power peaking operations, and any remaining water will be released for conservation of the fishery resources.

Before construction and operation of Kortes Unit, the stream reach below the dam site contained an excellent trout fishery. However, once Kortes Unit was built, this resource began to deteriorate. Fish kills would frequently occur due to shut-downs of the Kortes hydroelectric plant. Fishermen and area residents were concerned about the destruction of this valuable fishery. Acting upon this concern, the Fish and Wildlife Service and the Wyoming Game and Fish Department convinced the Bureau of Reclamation in 1963 that field studies of various flow regimes should be made. The result of these studies, which were partially funded by the Bureau of Reclamation, was a recommendation to the Bureau that the operation of Kortes power plant be modified to assure a continuous flow of at least 500 cfs between Kortes Dam and Pathfinder Reservoir. In 1964, the Bureau of Reclamation began releasing 500 cfs pending Congressional reauthorization.

In September 1966, the BR completed a special report for the purpose of securing Congressional approval to change the operation of the Kortes Unit from a single-purpose hydroelectric power development to serve a dual purpose. The report analyzed the benefits, costs, revenues, and cost allocations with and without the fishery flow. For economic justification, it concluded that the adverse effects at Kortes would be more than offset by the benefits of fishery enhancement. In fact, the benefit-cost ratio increased from 1.31 to 1.36.

In this illustrative situation, important decisions were made by the Fish and Wildlife Service and the Wyoming Game and Fish Department in seeking reauthorization; the Bureau of Reclamation in agreeing to conduct field studies and prepare a report to secure Congressional approval; and the Congressional Committees in supporting the Bureau's position. The fish and game agencies' action was greatly influenced by the valuable fishery at stake while the Bureau's decision was primarily influenced by the great demand for, and little opposition to reauthorization. No economic interest, such as an irrigation district or a municipality, was opposed to reauthorization. The increased benefit-cost ratio from the proposed modification was less important since the project prior to reauthorization was already cost-effective. Although the maintenance of instream flows could result in decreased power production from Kortes Unit, the Bureau of Reclamation could recoup these losses from other hydroelectric projects in the same system. Finally, a positive decision by Congress was assured because of the lack of opposition to reauthorization.

The reauthorization of Kortes Unit took approximately eight years and incurred substantial cost in time and money among all parties involved. For instance, the Wyoming Game and Fish Department expended between 2 and 3 person-years of effort to conduct its part of the flow studies. These commitments drained some of the limited resources of construction and fish and wildlife agencies. On the positive side, increased flow releases were provided almost immediately after the fish and game agencies completed their study and continued for seven years while project reauthorization was in process. These increased reservoir releases have usually sustained the prescribed minimum flows downstream and restored the downstream fishery.

IV. Evaluation

As shown by the illustration, the strategy of project reauthorization can successfully provide for increased flow releases. For several reasons, however, reauthorization is an unusual occurrence, particularly for fish and wildlife purposes. Once a water resource project is constructed and operating, the fishery interests and the construction agencies have little incentive to incur the expense and time needed to reassess project operations unless a combination of distinctive factors is present. As illustrated by the Kortes Unit reauthorization, the most important factors are the threat to a valuable resource, great demand for project modification, and absence of organized opposition. These factors have never materialized to such a degree as to result in the application of this strategy in California.

Other factors in the successful outcome included increased benefits from reauthorization and the ability to recover the losses caused by changing the use of some water stored in the Kortes reservoir. Because this combination of factors is required for the successful implementation of this strategy, both California Department of Fish and Game and FWS personnel believe it probably will have limited application in the future. Still, if the right combination of factors does occur, this strategy offers two noteworthy advantages. It provides a long-term solution with a firm legal basis. The reauthorizing legislation legally guarantees the necessary flows in perpetuity or until the legislation is again amended.

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STATE-FEDERAL WILD AND SCENIC RIVERS SYSTEM

I. Identification

The addition of a stream segment to the Federal Wild and Scenic Rivers System which provides for reservation of flows sufficient to accomplish the purposes of the Act, involves administrative and/or legislative action provided by the National Wild and Scenic River Act (P.L. 94-486). Designation as a wild or scenic river has the effect of reserving historical instream flows since new stream diversions and impoundments are prohibited, and may be restricted below or above the designated river segment. If a river is to be managed entirely or partly by a Federal agency, or if it lies wholly or partly within a National Park, Forest, Wildlife Refuge or other Federal land, an act of Congress is required. The Secretary of Interior can grant a Federal designation if the river is part of a state river protection program. California adopted a Wild and Scenic Rivers Act in 1972. The protection afforded stream by the legislation is similar to the protection granted by the Federal Wild and Scenic Rivers Act.

II. Application

This strategy on a Federal level can be applied where a free-flowing river or stream segment is at least 25 miles long and bordered by a visually appealing landscape. The Wild and Scenic Rivers Act defines river segments as wild, scenic, and recreational:

> Wild river areas are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic river areas are free of impoundments, with shorelines largely undeveloped, but accessible in places by roads. Recreational river areas are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

The Forest Service and Heritage Conservation and Recreation Service have published clarifying guidelines for determining river segment classifications.

Although the California Department of Fish and Game, the Fish and Wildlife Service, and the HCRS may be able to initiate action through local interests, the local citizens themselves must organize and demonstrate local support to convince their Members of Congress to introduce a bill. Also, the HCRS is conducting a national inventory to determine suitable river segments to recommend to Congress for detailed study.

Congress must pass a bill authorizing a study of the river in question. Such bills must go through the legislative process, including hearings before the House Interior and Insular Affairs Committee and the Senate Energy and Natural Resources Committee. If a study bill passes and is signed by the President, the Forest Service -- if the river flows through a National forest, or the HCRS in all other cases -- will work with state and local officials to inventory the river's resources and solicit views of the local landowners and citizens. The study could

cost approximately $200,000 (1977). If the river proposed meets the criteria, the study team will recommend:

- Classification of various river segments
- Acreage to be included in the river corridor
- Acquisition of land and easements
- Development of recreational facilities
- Assignment of a managing agency.

The study report, along with a Draft Environmental Impact Statement and a Draft Management Plan, is reviewed by agencies including the FWS and the state fish and game agency, by the public, and then submitted to Congress and the President. After clearance by the Office of Management and Budget, the President makes a recommendation to Congress. Given sufficient interest, Congress will schedule hearings to discuss the study report. Congress is free to accept all, some or none of the recommendations. If Congress passes a bill which approves the designation and the President signs it, the agency to administer the river segment will prepare detailed boundaries for the river corridor and prepare a Comprehensive Management and Development Plan. Congress must then appropriate money for acquisition of land and easements, construction of visitor facilities, and operating expenses such as salaries of river administrators.

The Congressional designation of a river segment takes several years from the time that Congress authorizes a study. Once a river is declared a study river, it must be designated within 10 years or dropped from consideration. However, the Federal Act protects the river segment under study from the authorization, funding and construction of water resource development projects, as well as restricts development above and below the study segment which would have an adverse effect. The Secretary (Interior or Agriculture) charged with the administration of the river segment would determine if the values for which the river was designated would be adversely affected by development. The Act Also protects these rivers for up to three years after the study report is submitted to Congress and the President, regardless of whether or not the river is to be included in the System. All minerals located on Federal lands within one-quarter mile of a study river are withdrawn from prospecting or leasing during the study period.

The California Wild and Scenic Rivers Act sets up a system similar to that created under Federal legislation. The California Act states that rivers are to be classified as either wild, scenic or recreational. The Act provides that no dam or reservoir is to be built on a designated river unless the Secretary of the State Department of Water Resources determines that a facility is necessary to satisfy domestic water supply needs and the facility will not adversely affect the stream's freeflowing condition.

The Act designated nine rivers and streams as part of the system. The Secretary of the State Department of Water Resources was mandated by the Act to classify each segment of the rivers included in the system; prepare a management plan to administer the rivers and their adjacent land areas, and submit the management plans to the Legislature for approval. The legislation also

allows the Secretary to recommend to the Legislature any other river qualified for inclusion in the system.

III. Illustration

The North Fork of the American River from its source to the Iowa Bridge and the Lower American from Nimbus Dam to its junction with the Sacramento River were originally included in the system by the legislation of 1972. Prior to the establishment of any dams on the American River, the river may have supported salmon runs exceeding 129,000 fish annually. Even with water resource development such as the Folsom-Nimbus project, the river still supports a valuable fishery. From 1960 to 1969 the American River salmon spawning reaches have been responsible for about 10% of all ocean sport and commercially caught King salmon in California's coastal waters.

Partially because of the fear that the river would be subject to furthur development, it was designated under the State Act. Another factor in its designation was the desire by the City and County of Sacramento since the late 1950's to develop the Lower American River as a park and recreational area.

Although the California Department of Fish and Game did not contribute significantly in the initial designation of the river, in 1975 it was delegated the responsibility to develop a management plan for the Lower American River. The plan issued in July 1977 included recommendations for land and water use as well as recreational use. Several thousands of dollars were expended in the development of this study.

IV. Evaluation

Both the Federal Wild and Scenic Rivers Act and the California Wild and Scenic Rivers Act have been applied in California. One hundred and eight miles of the Feather River were included in the Federal Wild and Scenic Rivers System in 1968, and the Tuolumne River was being studied in 1978 for possible inclusion in the System. Nine rivers and streams, involving portions of the Klamath, Scott, Salmon, Trinity, New, Smith, Eel, Van Duzen, and American Rivers, have been included in the State System. Because the California Wild and Scenic Rivers System is patterned after the Federal System, the following evaluation of the Federal Act generally applies to the State Act as well.

The designation of a river or stream segment under the Wild and Scenic Rivers Act (Section 13, part c) tends to reserve flows in quantities sufficient to accomplish the purposes of the Act. The Act prohibits new water resource development in the designated segment and restricts water resource development upstream and downstream which would adversely affect the designated river segment. It is a serious shortcoming, however, to take this approach to reserving flows without actually quantifying the streamflow regime that underlies the wild or scenic river designation, and monitoring the flows to ensure their maintenance, possibly by augmenting deficient flows with reservoir releases upstream from designated segments. The Act does not prohibit existing water users along a designated river segment from continuing their use; it only prohibits new appropriations. In fact, the Act states that any taking by the United States of a water right which is vested under either state or Federal law at the time a river is included in the national System shall entitle the owner to just compensation.

Inclusion in the System also protects the river segment from Federally funded water resource development. Therefore, no Federally funded dams and reservoirs will be built on designated river segments. However, this in no way guarantees that sufficient flows will occur to preserve the developed fish and wildlife resources. Some means of linking instream flow needs of fish and wildlife to this process for streamflow protection will be necessary. In 1977, the FWS, in conjunction with western state fish and game agencies, conducted a study which identified and mapped stream segments having substantial fish and wildlife value. The results from this study may be used by the HCRS when it expands its own study in 1978 to identify additional stream segments for inclusion in the Federal Wild and Scenic Rivers System.

Future effectiveness of this strategy will depend on developing and maintaining local support, and will be constrained by the substantial costs involved in its implementation. The Congressional or state legislative approval required to study a river segment and include it in the national System may take several years. Nevertheless, the strategy does provide for a permanent maintenance of historical flows and prohibits future development. Its future effectiveness will hinge most of all on relating streamflow maintenance to quantifiable fish and wildlife values. This quantitative link is not inherent in the Wild and Scenic River Act, but it may be possible to bridge the gap administratively.

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STATE DEFINITION OF NAVIGABLE WATERS

I. Identification

This strategy allows for the California Department of Fish and Game participation in water right adjudications to guarantee sufficient flows to protect the fishery resource in the stream being adjudicated. The California Department of Fish and Game's participation would rest on the public trust doctrine. This doctrine generally declares that the State must manage its resources for the public's benefit. In this instance, the Department of Fish and Game would protect the public's property interest in the fishery resources of the State by resorting to a minimum flow recommendation based on the current judicial (or administrative) definition of navigable waters. Such a definition establishes the least flow required to preserve stream navigability, providing a base flow requirement which could help to obtain adjudicated water rights favorable to instream flow needs for fish and wildlife. In the absence of such a definition, as in California, the fish and wildlife interests would have to seek one through judicial decree or executive order. Although there is no statutory basis for this theory, a series of cases can be construed to form the legal basis of this strategy (People v. Mack, 97 Cal. Rpt. 448, 1971; People v. Monterey Fish Products Co. 195 Cal. 548, 1925).

II. Application

This strategy could be applied whenever an adjudication takes place. During an adjudication, the existing rights of water users in a particular watershed are determined by the California Water Resources Board. The primary party applying this strategy would be the California Department of Fish and Game.

The California Department of Fish and Game must decide which adjudications they would participate in and how much stream flow to request. The Department would argue that sufficient flows must remain in streams, to protect the public's property interest in the fishery resources as well as navigation. Decision-making also rests with the California Water Resources Control Board which would decide whether to allow the California Fish and Game Commission into the adjudication and whether to accept its request. The primary cost of this strategy would be incurred by the California Department of Fish and Game in studying streams and participating in the adjudications.

III. Illustration

No example could be found where the California Department of Fish and Game has actually applied or other fish and wildlife interests have sought to obtain a State definition of navigable waters.

IV. Evaluation

This strategy has not been implemented for a number of reasons. The lack of either a statutory basis or case law precedent for this strategy has deterred the California Fish and Game Commission from ever attempting it. In addition, the California Water Resources Board most likely would reject such an approach and, on appeal, the courts probably would uphold the Board's decision.

Until the courts or California Water Resources Control Board become more flexible or the legislature passes an applicable statute, this strategy's future effectiveness is severely limited. If, however, the legal and administrative situation changes, the public trust doctine as it pertains to stream navigability could become a useful strategy. It could be a relatively expensive strategy because of the legal expertise and cost involved in participating in separate adjudications of many individual water right claims. However, the strategy is potentially applicable to every stream in the State.

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STATE-FEDERAL INTERAGENCY CONSULTATION

I. Identification

Whenever a Federal agency constructs, modifies, or licenses a reservoir project, it must consult with the Fish and Wildlife Service and the California Department of Fish and Game to obtain and consider their recommendations concerning fish and wildlife resource preservation and development, including the provision of instream flow. Refining and formalizing this consultative process is the goal of this strategy. The formulation and adoption of interagency agreements, construction or permit agency regulations or formal procedures, and strict enforcement of these requirements are tactics available to implement this strategy.

The legal or administrative basis for this strategy is the Fish and Wildlife Coordination Act (FWCA) and the regulations or procedures the Federal construction and permit agencies have developed to implement the Act. The FWCA (P.L. 85-264) passed in 1958, expanded upon the Act that created the FWS in 1946 (P.L. 79-232). The FWCA requires that full consideration be given to the recommendations of the FWS; the 1946 Act only required consultation between the construction agency and the Federal and state fish and game agencies.

II. Application

The FWS, the California Department of Fish and Game and a private interest group are the parties who would instigate this strategy. At the present time, neither the Bureau of Reclamation, Soil Conservation Service, Forest Service nor Bureau of Land Management have an interagency agreement with the FWS at either the regional or headquarters level to implement the FWCA. The Corps of Engineers has a cooperative agreement with the FWS, enacted in 1954. This agreement will be discussed as an illustration of this strategy. All of these agencies, though, do have formalized procedures to implement the FWCA. In addition, the Corps will soon be issuing regulations concerning their implementation of the FWCA. A review of these procedures and proposed regulations is necessary to assess the decision making and costs involved in implementing this strategy.

According to the Bureau of Reclamation policy, coordination in all phases of planning should include:

- Early notification by the BR of the initiation of planning studies
- Opportunity for the FWS to participate in the formulation and evaluation of project plans
- Opportunity for the FWS to provide reports to the BR, including recommendations relating to fish and wildlife aspects of plans or proposals.

FWS reports on BR projects are funded by the Bureau. Congress allocates funds to the FWS through the BR's Washington office which disburses funds to the FWS through the Regional Offices. Beginning in 1978, such funds will not be earmarked in the appropriation act and disbursed from Washington, but rather will be transferred at the field level.

Although not referring explicitly to the FWCA, the SCS procedures do specify that Federal and state fish and wildlife agencies be encouraged to participate actively in project planning and to incorporate measures needed in each project to the maximum extent feasible. According to Forest Service procedures,

> . . . it will be the policy of the Forest Service to refer to the Fish and Wildlife Service and/or the appropriate state fish and wildlife agency, all proposed projects which have a potential for affecting fish and wildlife resources to such an extent as to warrant the investigation and recommendations of these agencies.

The BLM's regulations and procedures do not refer to the FWCA, but their new organic act, the Federal Land Policy and Management Act of 1976 (P.L. 94-579), indicates that fish and wildlife values will be considered in granting permits for rights-of-way. Conditions to guarantee these values, such as minimum releases from reservoirs to augment instream flows, can be inserted in the permits.

The Corps draft regulations stipulate that the District Engineer, at least every six months, provide the Regional Director of the FWS with information concerning all pre- and post-authorization studies. This information will be helpful to the FWS in making decisions on personnel requirements and preparing investigative schedules. The draft regulations also require the District Engineer to notify the Regional Director of the initiation of any project investigation and coordinate with the FWS throughout the investigation. The District Engineer must consider to the fullest extent practicable the recommendations of the fish and wildlife agencies.

Beginning with FY 1978, funds for the FWCA studies will no longer be budgeted as line items and transferred at the headquarters level. Rather, the District Engineer, after consultation with the FWS Regional Director, will include in his budget the funds necessary for the FWS to comply with the FWCA. The new draft regulations state that local entities must pay for the cost of water released for instream purposes. Also, local entities must furnish assurances that appropriate action will be taken to prevent downstream withdrawals of water that could negate fishery benefits credited to such releases.

In pursuing this strategy, the FWS can seek agency regulations or interagency agreements based on unilaterally adopted procedures, attempt to strengthen present procedures, or see that they are enforced on a project by project basis. If interagency agreements or agency regulations are to be drawn up, or existing procedures made more stringent, the required decision making would occur at the policy-making level of the FWS, not at the field level. To enforce the existing procedures, however, decision making must be at the field level.

In terms of personnel, time and money, the costs involved in implementing this strategy could be quite high. They would vary depending on the tactic that is used. Of the several tactics available, enforcing existing procedural requirements would probably incur the highest cost because it involves project by project application, yet this tactic may carry the greatest payoff.

III. Illustration

In 1954, the FWS and Corps of Engineers enacted an interagency agreement to cover the Coordination Act of August 14, 1946 which, when subsequently amended, became the Fish and Wildlife Coordination Act (FWCA) of 1958. This agreement established guidelines for CE consideration of FWS recommendations for fishery preservation in planned water resource projects.

These guidelines stipulated that the District Engineer shall incorporate in a project report all recommendations of the FWS which are satisfactory to him, including, of course, recommended instream flow reservations. The District Engineer must explain in the report his reasons for rejecting those recommendations he found unsatisfactory. Although there is no provision in this interagency agreement for pre-project coordination, the CE is supposed to include fish and wildlife conservation as a project purpose if the effects of a project on fish and wildlife resources would be significant.

This agreement has not had much impact in California because few CE reservoir projects were planned or constructed from 1946 to 1958 in this State.

IV. Evaluation

It is difficult to determine the utility of this overall strategy. It is first necessary to ascertain what effect the Fish and Wildlife Coordination Act of 1958 has had on reserving instream flows. Strengthening the implementation of the Act through the application of the various tactics covered under this strategy could be expected to increase the probability of flow reservations.

A study performed by Enviro Control of instream flow recommendations made in Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington and Wyoming indicated that flows recommended after the 1958 amendments (FWCA) were accepted significantly more often than prior to that time. The fishery was maintained or improved significantly more often in the post-1958 projects than in the projects built before that time. However, there are no reliable statistics to gauge the success of flow recommendations in the last few years when procedures have become even more stringent.

Although the passage of the Fish and Wildlife Coordination Act of 1958 may have helped to reserve instream flows, making this Act more effective is the goal of this overall strategy. Enacting interagency agreements may be a promising tactic. On the other hand, the CE 1954 agreement is the only one presently operative. Construction and permit agencies probably would be unwilling to draw up such rigorous agreements since their own formalized procedures already contain most of the features in such an agreement. A distinct advantage of interagency agreements, in contrast to unilateral agency procedures, is that the FWS would have more of an opportunity to insert provisions it deems necessary. Also, an interagency agreement may imply more commitment on the part of the cooperating agencies. These characteristics, though, may explain why the Federal construction and permit agencies prefer merely formalizing their own procedures.

The strengthening of present procedures, even to the extent of adopting formal regulations which are more binding, may prove a promising tactic. The National Wildlife Federation has filed a petition in 1977 with the Department of the Interior, Department of the Army, and the Council on Environmental Quality to compel Federal

construction and operating agencies to adopt formal procedures in reviewing FWS recommendations for mitigating the adverse impact of development upon fish and wildlife habitats. The petition seeks to alleviate the dependency of the FWS on the construction agencies for transfer funds by having mitigative features funded and implemented concurrently with project construction, or in advance of project construction where there may be interference with the achievement of mitigative goals.

The Wildlife Federation is optimistic that the petitioned agencies will draft formal review procedures. However, the agencies are not expected to fully comply with the petition, but they are expected to take significant steps toward the desired end. For instance, the Corps has drafted new procedures and regulations but they will not be formalized until other petitioned agencies complete their drafts. This petition relies upon existing legislation (FWCA) which avoids the pitfalls of introducing new legislation into Congress.

Another promising tactic is promoting the enforcement of existing procedures and regulations. The construction and license agencies, having issued these requirements, are officially committed to them. Issued by the agencies' main offices in Washington, D.C., these procedures or regulations are not always adhered to in the field. This may be attributed to negligence or mere unfamiliarity on the part of the construction and permit agencies. Also, some FWS Field Offices may be unaware of construction and permit agency procedures.

The major costs involved with the tactics subsumed under this general strategy would result from drafting procedures, regulations or agreements, and attempting to convince the construction or permit agencies to adopt them. The costs, to a large extent, are a function of the cooperation proffered by the agencies solicited.

A major constraint on the effectiveness of this strategy would be the difficulty the FWS would have in determining whether or not the procedural requirements are being honored. FWS knowledge of project planning and development depends on notification by the construction or permit agency. Notification may be delayed until late in the planning phase. Conceivably, the FWS would spend substantial time and effort in trying to be cognizant of project planning programs if it is not properly notified.

Even if proper notification is made, successful implementation of agency procedures for cooperation with fish and wildlife interests is dependent on the availability of funding and personnel. The FWS incurs significant cost when detailed investigations are conducted in the field and subsequent recommendations are formulated for planned projects such as dams and reservoirs. Although the construction agencies transfer funds to the FWS for this purpose, these may not be adequate. Hopefully, this situation may improve, at least as it involves the BR and CE, because of the new funding procedure that the Bureau and Corps will initiate in fiscal year 1978. Transfers of General Investigation funds will be made at the regional level following negotiations of appropriate amounts with the respective FWS Regions. These transfers will be made by memoranda of agreement executed by the affected agency field offices. This new communication at the field level could result in greater funding.

Another constraint upon the effectiveness of this strategy is the lack of an enforcement mechanism. If a field office of a permit or construction agency does not conform with its own procedures or an interagency agreement, the FWS can take no action other than lodging a complaint with the offending agency. The pending adoption of CE regulations is a step in the right direction because the regulations will have the force of law. Concerning the Forest Service and BLM, regulations

to be issued in accordance with the Federal Land Policy and Management Act of 1976 (P.L. 94-579) may also afford further protection to fish and wildlife.

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FEDERAL LICENSE AND PERMIT STIPULATIONS

I. Identification

The inclusion of a minimum flow stipulation in a dam and reservoir project license or permit ensures that flows will be required to be released as a matter of legal right. To ensure that minimum flows are legally required as an integral part of project operations, it is essential that fish and wildlife interests take an active part in the licensing or permit process involved with an application for use of land and water under Federal ownership or control.

The legal basis for this strategy in relation to Forest Service and BLM-controlled lands derives from the Federal Land Policy and Management Act of 1976 (P.L. 94-579). Conversations with the FS and BLM have pointed out that, until pending regulations are issued persuant to P.L. 94-579, the permit process for these agencies will continue to maintain vestiges of previous legislation which regulated acquisition of Federal lands. The legal basis with regard to the Federal Energy Regulatory Commission derives from the regulatory authority of the FERC over the non-Federal hydroelectric industry. As a quasi-judicial commission of the Department of Energy, it licenses construction, operation and maintenance of dam and reservoir projects utilizing waters and lands of the United States under mandates of the Federal Power Act of 1920 and other Federal laws.

II. Application

This strategy may be utilized when it is determined that a minimum instream flow is needed downstream from a proposed reservoir project requiring a permit or license or subject to relicensing. Participating parties in this strategy would be the Federal agency in control of the affected land and water resources, the project permittee or licensee and an interested party advocating fish and wildlife interests such as the FWS or California Department of Fish and Game. In the case of a FERC-regulated project, any person or group of persons whose participation may be in the public interest could participate.

The permit process followed by both the Forest Service and BLM are similar. This discussion will focus on this process as it relates to the Forest Service. Presently, the critical point at which fish and wildlife interests may exert pressure for instream flow stipulations in the project permit occurs after the applicant has submitted a plan of construction, operation, and rehabilitation of the proposed right-of-way in National Forests. At this time, an impact survey is performed by the FS which must contain the "views of the Fish and Wildlife Service. . . and State fish and game departments where fishery and wildlife values are of importance. The Forest Supervisor will ask the Fish and Wildlife Service and State fish and game departments for a report." At this point the interested fish and game agency should submit its minimum flow recommendations and any studies documenting the efficacy of the suggested flow regime in providing for fish and wildlife habitats.

Upon receiving the plans of the applicant and reviewing the completed impact survey, the FS determines whether the land in question can accommodate the proposed use. If an affirmative determination is made, a permit is granted. Permits normally contain a list of terms and conditions. Section 505 of P.L. 94-579 states that one of the purposes of the terms and conditions is to minimize damage to scenic and aesthetic values and fish and wildlife habitats, and to otherwise

protect the environment. Upon granting the permit with accompanying terms and conditions, the applicant must submit detailed plans of construction to the FS. If these plans comply with requirements of the permit, construction may then proceed.

Within this process, it is important that the interested fish and wildlife agency make a specific instream flow recommendation to the Forest Supervisor when asked to comment on potential project impact. Such action will ensure that a minimum instream flow will be considered for inclusion in the final project permit as part of the terms and conditions of project operations.

In the FERC licensing process, there are two critical points at which proponents of this strategy may exert influence. The first point occurs during the applicants' preparation of the Application for License of which Exhibit S is a component. Exhibit S, as described in 18.CFR 4.41, Rules of Practice and Procedure, requires that:

> The Applicant shall prepare this exhibit on the basis of studies made after consultation and in cooperation with the U.S. Fish and Wildlife Service, Department of the Interior and appropriate state fish and wildlife agencies. . . The exhibit shall include a statement on the nature and extent of applicants' consultation and cooperation with the above agencies.

It is thus essential that fish and wildlife interests make a concerted and organized contribution to this process involving Exhibit S at an early stage in project planning to sensitize the applicant to the importance of instream flow needs and guarantee coverage of this issue in the application review.

The second point at which fish and wildlife advocates may apply their influence occurs after the Application for License is submitted to the FERC. Upon its receipt, the FERC reviews the application to determine whether or not it fulfills the requirements of Rules of Practice and Procedure. Public notice of application is then given, specifying a final date for filing protests, notices of intervention or petitions to intervene. Concurrent with this notification, copies of the completed application are disseminated to Federal agencies, state agencies and other interested parties for comment and review.

Upon review of the application and determination that instream flow needs are not adequately provided for, an interested party can petition the FERC to intervene in the applicant's licensing. It is essential that such petitions be made before the final date specified by the Commission; otherwise, the petitions may be rejected as "untimely". Section 1.8d of Rules of Practice and Procedure does state that "in extraordinary circumstances for good cause shown, the Commission (may authorize) a late filing." In the event that a petitioner's right to intervene is granted, a hearing is scheduled to resolve the difference. However, prior to the hearing, it often happens that the applicant and the petitioner meet informally and resolve the issue.

Prior to scheduling a hearing, the FERC is also empowered to authorize a Technical Session in which FERC staff meets with the interested party and the applicant in order to clarify the issue, and if possible, resolve it. If resolution is not accomplished in either an informal meeting between the applicant and the intervenor or in the Technical Session, a pre-hearing conference is arranged by the FERC's Office of General Counsel. At this time, the issue is further defined and another attempt is made at resolution. Finally, if the issue is still unresolved, a hearing is scheduled before an Administrative Law Judge of the the FERC. Both parties present their case and a decision is made and transmitted to the Commission. This final hearing decision is not binding on the decision of the five-man Commission; however, the decision of the Commission is usually in agreement with hearing findings.

The term of license for most FERC projects is 50 years. The process followed for relicensing of projects is identical to the process discussed previously except that an Exhibit S is not required.

In connection with the Forest Service or BLM permit process, the costs associated with this strategy are limited to those incurred during preparation of the fish and wildlife input to the impact survey. The magnitude of the instream flow study and time associated with preparing the report submitted to the permit agency as part of this input would be the principal cost determinants.

For FERC-licensed projects, the costs linked with this strategy are directly dependent on the extent of agreement between the intervenor and the applicant. Expenditures of time and money increase as negotiations advance through the informal meeting stage to the FERC hearing stage. Occasionally, instream flow studies must be performed to provide data for a decision. The studies are authorized at an informal level or as a result of an FERC hearing. The funding for these studies is normally supplied by the utility company applicant. Most likely the studies would be performed by the California Department of Fish and Game in cooperation with the staff biologist for the utility company.

III. Illustration

The Battle Creek Project (FERC License #1121) was licensed on January 7, 1932 with a scheduled expiration date of September 11, 1980. Battle Creek is a tributary of the Sacramento River. The Battle Creek Project is located at the north end of the Central Valley, 36 miles east of Redding in Shasta and Tehama Counties, California. The original license issued by the FERC did not contain a minimum flow stipulation for the 28-mile reach of Battle Creek between North Battle Creek Reservoir and Coleman Forebay, the project's uppermost and lowermost facilities.

Existing facilities of this project were 5 dams and 17 diversions; 2 major and 3 minor storage reservoirs; and 4 power plants with a combined capacity of 30,200 kilowatts. The redeveloped Battle Creek Project as proposed in November 1969 will consist primarily of four new power plants containing mechanical, generating and transmission facilities located immediately adjacent to the existing plants which are to be retired.

Information concerning the fishery in Battle Creek prior to the 1930's is scanty. Construction in 1945 of Shasta Dam and its afterbay--Keswick Dam--blocked the access of migratory species to almost 50% of spawning gravel in

the Sacramento River system. As a result of this occurrence, an investigation was conducted to formulate a salmon salvage program to preserve the Sacramento River system's anadromous fish populations. At that time, it was determined that Battle Creek was one of the two tributaries of the Sacramento River between Shasta Dam and the mouth of the Feather River having salvage potential. Consequently, Coleman Hatchery, situated on the north bank of Battle Creek 6 miles above the junction of that stream with the Sacramento River, was utilized as a spawning facility for fish populations displaced by Shasta and Keswick Dams.

At the present time, Battle Creek above the Coleman Hatchery supports native populations of steelhead trout, rainbow trout and Fall chinook. Catchable size rainbow and brown trout are stocked in project waters and serve to satisfy the heavy angler use sustained by the Battle Creek system as well as to support natural recruitment. Conversations with fishery biologists have pointed out that guaranteed minimum flows are essential to the maintenance of the steelhead fishery since this species resides in freshwater for a year prior to its migration to sea. Also, it is critical that stipulations be included in the FERC license for the Battle Creek Project to ensure that an adequate water supply is provided to Coleman Hatchery.

On November 3, 1969, the FERC received an Application for License from the Pacific Gas and Electric Company (PG&E) for the proposed Battle Creek System, an enlargement of the existing Battle Creek Project which had been issued a license in 1932. On April 8, 1971, public notice of PG&E's application was made by the FERC with June 3, 1971, designated as the last date for filing protests, notices of intervention or petitions to intervene. On July 12, 1971, the State of California through its Department of Fish and Game filed an untimely petition to intervene for the purpose of protecting fish, wildlife and recreational resources in the vicinity of the project. Although the petition was advanced after the designated submission deadline, the FERC admitted it for consideration. On April 12, 1973, the State of California withdrew its petition to intervene.

During the 21 months between its initial intervention and eventual withdrawal of the petition, the California Department of Fish and Game met informally with officials from PG&E to clarify and expand upon the minimum flows included in the Applicant's original Exhibit S. Bargaining was successful and a Memo of Agreement was struck. The State of California then withdrew its petition to intervene provided that conditions set forth in the agreement be included in the final FERC license. On August 13, 1976, the FERC issued a license specifying that minimum flows agreed to by the State of California and PG&E be included as Article 33 in the licensing document.

Action by the State of California in two distinct phases of the FERC licensing process ensured the inclusion of a satisfactory flow stipulation in the final license. First, during the preparation of Exhibit S, the California Department of Fish and Game maintained close contact with PG&E, negotiating with the applicant for minimum instream flows and minimum reservoir pool levels. However, the minimum flow stipulations included in the Exhibit S submitted by the applicant to the FERC still did not provide for instream flow needs as envisioned by the Department of Fish and Game. The flows specified in PG&E's Exhibit S did not represent a significant deviation from those agreed upon by the State during negotiations; however, some of the phrasing was not sufficiently explicit, especially with regard to flow releases for use at Coleman Hatchery. Thus, the State petitioned to intervene, thereby securing a voice in final determination of the license's minimum flow stipulation.

It is apparent that fish and wildlife interests must participate actively and early in the Exhibit S planning process as well as remain vigilant throughout later licensing proceedings to guarantee that agreed upon instream flow levels are considered in the FERC review. In the above illustration, the costs incurred by the State fish and game agency and the PG&E were minimal because of the early stage in which consultation took place and the cooperation enjoyed after California's petition to intervene. Costs incurred by the FERC were minimal since the applicant and interested party were able to resolve their differences informally without resorting to the FERC hearing process.

IV. Evaluation

As illustrated by the example of the Battle Creek Project, this strategy has displayed past utility in California, especially as applied to FERC projects. Instream flow requirements often have been inserted in licenses, although not always in amounts considered optimum for fish and wildlife. This strategy, as applied to FS and BLM projects, has had limited utility in California.

Despite past success, there have been some constraints on the strategy's effectiveness. Applicants were understandably wary of accepting instream flow recommendations which often were based on very cursory stream investigations, especially when the guarantee of such flows would increase project costs. Although the licensing or permit process contained requirements for consideration of instream flow needs, the inability of the interested party to develop realistic recommendations resulted in either an omission of instream flow stipulations or inclusion of a clause merely guaranteeing "adequate" or "suitable" flows.

Often a project sponsor will agree to supply minimum flows on an informal non-contractual basis. Such "gentlemen's agreements" have sometimes been responsible for maintaining fisheries below reservoir projects; however, more often than not, the absence of a compelling legal force guaranteeing minimum reservoir releases results in a sponsor withholding flows during critical periods of competitive user needs. If the license or permit stipulates flow releases, the licensee or permittee are legally obligated to provide them. Most other instream flow strategies do not lead to as strong a legal obligation.

The future utilization of this strategy will undoubtedly be enhanced as a result of the current research on instream flows needs. Also, because of the established administrative procedure, the strong legal obligation of a permit stipulation, and the large number of FERC projects in California, fish and wildlife interests within the State are optimistic about the strategy's future effectiveness. Furthermore, further consideration may be given to instream flows in FS and BLM projects with the implementation of the Federal Land Policy and Management Act of 1976 (P.L. 94-579).

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STATE ALLOCATION OF RESERVOIR SPACE

I. Identification

Under this strategy, dams and reservoirs constructed by a California State agency will be operated with reservoir space specifically allocated to provide flow releases to support the aquatic habitat below the dam. The legal basis of this strategy resides in provisions of the California Fish and Game Code, the Davis-Dolwig Act, and the California Water Code. The Davis-Dolwig Act applies to the construction of water resource projects by the California Department of Water Resources and has a provision ensuring that instream flow releases for fish and wildlife will be fully considered. As provided by the California Water Code § 1243, stipulations which incorporate Department of Fish and Game recommendations, such as those requesting an allocation of storage space, would be included in the water permit granted by the State Water Resources Control Board.

II. Application

This strategy can be applied whenever a State agency, such as the State Department of Water Resources, constructs a reservoir and applies to the State Water Resources Control Board for a water use permit. The applicable parties are the State construction agency, the Water Resources Control Board, and the California Department of Fish and Game.

Public and private entities must notify the Department of Fish and Game if they plan to divert or obstruct the natural flow of a stream or change the bed, channel, or bank of a stream (Cal. Fish and Game Code § § 1601 and 1603). If "an existing fish or wildlife resource may be substantially adversely affected ...," the Department of Fish and Game must propose reasonable modifications or measures, such as perserved reservoir storage space, to protect the fish and wildlife resources (Cal. Fish and Game Code § § 1601 and 1603). The entity may not begin construction until it is determined that fish and wildlife resources will not be affected adversely or until Fish and Game's proposals or an arbitration panel's decisions are incorporated into the project plan. The California Resources Agency would assume an arbitration role in cases where disputes over acceptance of recommendations could not be resolved. The Resources Agency was established in the early 1970's to regulate, coordinate, and arbitrate activities and disputes among the State's ten resource agencies.

Within the provisions of the Davis-Dolwig Act, the Department of Water Resources must give "full consideration" to recommendations made by Fish and Game and other interested Federal, State, and local agencies aimed at preserving and enhancing fish, wildlife, and recreation uses. The Department must incorporate any recommended feature, "including, but not limited to, additional storage capacity", that it determines to be necessary or desirable "to the extent that such features are consistent with other uses of the project, if any."

Two decision points are vital to the implementation of this strategy. The California Department of Fish and Game must quantify the amount of flow needed for the downstream fishery and, on the basis of this quantification, make a recommendation of required storage allocation to the State Water Resources Control Board and to the Department of Water Resources for projects constructed

by the Department. Next, the State Water Resources Control Board must decide whether to accept the Department of Fish and Game's recommendation and include it as a condition of the permit.

The major cost of this storage involves the personnel time expended by the California Department of Fish and Game in formulating and presenting recommendations.

III. Illustration

The major inter-basin water transfer project of the California Department of Water Resources is the California State Water Project. This project is centered in the Sacramento-San Joaquin Delta which is a major area for recreational fishing. Rivers in the Delta serve as passage routes for the State's largest King Salmon runs and second largest steelhead trout runs. The State's larges concentration of striped bass and American shad also live in waters of the Delta.

The State Department of Water Resources first received a permit for this project in 1967. At that time the Water Resources Control Board Reserved jurisdiction to impose additional conditions on the permit. Between July and October of 1970 the Water Resources Control Board held hearings on the State Water Project. Testimony included recommendations made by the California Department of Fish and Game concerning the needs of fish and wildlife. In July 1971 additional conditions were placed on the permit for the State Water Project.

The added conditions included the "State Delta Standards" which were water quality criteria to be maintained at various locations in the Delta. Also included as a condition was the requirement that a certain amount of storage be devoted to reservoir releases for fish and wildlife protection. The releases mandated by the Water Resources Control Board exceed, during part of the year, the flows which would exist under natural conditions. Specific recommendations of the California Department of Fish and Game were incorporated as permit conditions.

In addition, the Department of Fish and Game continues to monitor fish, benthos, phytoplankton, and zooplankton. The major costs of this strategy are time and monies expended by the California Department of Fish and Game to formulate their recommendations and monitor the environment.

EV. Evaluation

This strategy has demonstrated considerable utility in California as shown by the Sacramento-San Joaquin Delta illustration. The advantage of this strategy is that it is institutionalized within the permit process in the State of California and has a firm legal basis. The major constraint on its successful application is that the State Water Resources Control Board does not have to accept the recommendations of the California Department of Fish and Game, although in recent years it has accepted virtually all recommendations.

In judging the future effectiveness of this strategy, perhaps the most important factor is its limited applicability. There are few State projects where this strategy could be applied; most State projects are components

of the California State Water Project, for which few component projects remain to be completed. The cost of this strategy may be great, depending on the effort put forth by the California Department of Fish and Game in formulating recommendations and the amount of time spent in hearings before the State Water Resources Control Board.

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STATE PURCHASE AND LEASE OF WATER RIGHTS

I. Identification

Contractual arrangements to reserve instream flows include the direct purchase of flow rights, the leasing of water rights, and the purchase of shares in a mutual water company. The legal basis of this strategy lies in the provisions of the California Fish and Game Code, § 1345 et. seq. This statute implicitly empowers the Department of Fish and Game to acquire waters by purchase and lease, as well as to purchase shares in a mutual water company. This authority may be construed to encompass the purchase of both direct flow rights and reservoir storage.

II. Application

The California Department of Fish and Game might acquire reservoir storage by purchase, lease, and the purchase of shares in a mutual water company pursuant to California Fish and Game Code, § 1345 et. seq. The Department of Fish and Game does not have any programs for the purchase or lease of direct flow rights or reservoir storage to protect instream flows. The acquisition of reservoir storage might be used by the Department to provide for reservoir releases to maintain instream flows below a dam. The lease of water rights provides only an interim solution, but could be applied to protect a valuable fishery in a particular stream where no permanent supply of flows is available for purchase. A mutual water company is a corporation usually organized by landowners to acquire water for domestic and agricultural use in a designated area. Each shareholder receives a pro rata amount of water based upon the number of shares owned in the company. To employ this arrangement, the Department of Fish and Game, and a private party or conservation organization would purchase shares in a mutual water company to acquire instream rights and leave their entitled water in the stream.

The major cost of implementing this strategy is, of course, the high price of water rights which has risen dramatically in the last few years and will probably continue to rise in the future. However, the acquired water right might be sold to be exercised at a point downstream where few instream values worth preserving existing, thereby defraying part of the acquisition cost. Other costs include expenditures of personnel time and funds for studies to identify streams where a purchase would have the greatest benefit, and for the substantial effort to negotiate for the purchase.

III. Illustration

This strategy has not been implemented in California, but the following illustration from Colorado serves to demonstrate the past utility of this strategy. In 1977 the Colorado Division of Wildlife purchased 1 cfs in Boulder Creek above the City of Boulder. It purchased this flow from a private owner for $18,000. The seller was located with the aid of the Nature Conservancy and the Colorado Attorney General's Office.

Although 1 cfs seems to be a small amount of water, this purchase is crucial to preserve the valuable trout fishery in Boulder Creek. The water right purchased is also quite senior, pointing out one of the prime benefits available with this strategy. The importance of this 1 cfs purchase was realized by the Colorado Division of Wildlife while they were studying Boulder Creek as part of their program to implement Senate Bill 97.

IV. Evaluation

Contractual arrangements for the enhancement of instream flow have not been used in California, because the California Department of Fish and Game, through their legal representatives in the California Attorney General's office, oppose the use of this strategy. They maintain that the public has a right to adequate flows for fish life; therefore, public funds should not be used to purchase what already belongs to the public by right. Also, even though the reservoir storage could be purchased to be used for flow releases, such releases are subject to appropriation by downstream users.

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WATER RESOURCE PLANNING

FEDERAL WATER RESOURCES COUNCIL PLANNING PROGRAMS

I. Identification

This strategy can be implemented either through Section 13(a) of the Non-Nuclear Research and Development Act of 1974 or through Section 209 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). Section 13(a) of the Non-Nuclear Research and Development Act of 1974 requires the Water Resources Council (WRC), at the request of the Secretary of the Department of Energy to undertake assessments of water resources requirements and water supply availability for the development of non-nuclear energy technology. The assessment is to include the environmental impact resulting from the use of water in developing the technology. Section 209 of the Federal Water Pollution Control Act Amendments of 1972 directs the WRC to prepare so-called Level B Plans for all river basins of the United States.

The planning process of the WRC derives from the Water Resources Planning Act of 1965 (Public Law 89-80), which was designed to encourage conservation, development, and use of the nation's water and land resources on a comprehensive and coordinated basis by Federal, state and local governments and private enterprise.

II. Application

In the instance of Section 13(a) assessments, this strategy would arise whenever the DOE Secretary requests the WRC to undertake a study of water resource requirements in California for the development of a non-nuclear technology. Other parties which may become involved in the application of this strategy include a river basin commission, a State resource agency, a Federal construction agency, or the FWS. These agencies would become involved in the assessment through delegation by the WRC.

The assessment is similar to a WRC Level A Study in that its geographical scope is a river basin with a coarse level of detail. However, it is distinct because its subject matter is limited to the relationship between water use and the development of non-nuclear technology. Regarding water use, several components must be examined: an analysis of State water laws and State and Federal water rights; an evaluation of the effects of the technological development on water quality and supply; and an analysis of the environmental, social, and economic impact of any change in current use of water resources.

The 13(a) assessment does not specifically call for a study of instream flows; however, such a study can be included as part of the required environmental analysis. The crucial decision involved in implementing this strategy is the weight given to instream flow values by those conducting the assessment.

The primary cost associated with implementing this approach is the time and personnel needed to conduct the assessment. Although there is no set time in which an assessment must be completed, it usually requires a minimum of ten months at a cost of several hundred thousands of dollars.

If Level B studies are undertaken, they are designed to resolve complex problems requiring interdisciplinary approaches and interagency inputs. These studies vary widely in scope and detail, focus on middle-term needs (15-25 years), and involve Federal, State and local interests, The findings of these studies are an integral part of the "Comprehensive, Coordinated, Joint plans" (CCJP's) prepared by the various River Basin Commissions (RBC's). The subject matter of these studies includes energy issues, water quality, land use and other water-related topics such as maintaining instream flows for fish and wildlife.

Just as the RBC is responsible for preparing a CCJP at the regional level, so too are many States responsible for preparing or revising Comprehensive State Water Plans governing future water policy decisions. With increasing frequency, these State plans include a listing of instream flow needs for fish and wildlife. In most cases, a State's participation in Level B planning is small in comparison to its Statewide water use planning efforts. As compared to Level B Plans, State Water Plans are relatively short-range. Once authorized, these plans directly influence the policy by which State water rights would be determined. It would be fortuitous, then, if Level B Plans and Comprehensive State Water Plans addressed common topics such as instream flow needs.

A major cost associated with the use of this approach results from State participation in a Level B planning effort. According to WRC requirements, a State must assume 25% of the total funding cost. Fortunately, the State's share in this cost need not be monetary but may be supplied in the form of in-kind services, such as office space and equipment or project support staff. In addition, costs are incurred by participating agencies in the planning process who fund State fish and game agencies to determine instream flow requirements.

III. Illustration

This strategy has not been implemented in California. Therefore, an example is used from Colorado to demonstrate the strategy's utility. An assessment of the water resource requirements for the development of coal and oil shale technology in the Upper Colorado River Basin will be undertaken in 1978 by the State of Colorado through its Department of Natural Resources, and by the State of Utah under delegation by the WRC. The WRC was requested to undertake this study by the DOE Secretary under § 13(a) of the 1974 Non-Nuclear Research and Development Act.

In addition to the States of Colorado and Utah, the Bureau of Reclamation and the Instream Flow Service Group of the Fish and Wildlife Service will participate in the assessment. The latter's participation resulted from aggressiveness and a good working relationship between the Instream Flow Service Group and Colorado's Department of Natural Resrouces. The participation of the Instream Flow organization ensures the consideration of the impacts of coal and oil shale development on instream flows as it relates to present and future water supply availability and quality. Of course, this assessment will not result in the reservation of any flows, but it will highlight the need to consider instream flow values when planning energy development.

The Upper Colorado River Basin assessment began in 1978. It will be performed in 10 months and have a budget of approximately $450,000. These funds will be dispersed in both Colorado and Utah.

IV. Evaluation

This strategy has had no past utility in California. However, the illustration from Colorado demonstrates some of the strategy's potential advantages and disadvantages. A major disadvantage is its inability to directly affect an instream flow reservation. However, as a component of the required environmental analysis within the scope of the 13(a) assessment; it might be brought to the attention of the DOE Secretary that private energy development subsidized by the DOE would not be environmentally acceptable in a particular basin, because of the threat to instream flows. It can be argued that this strategy entails a substantial expenditure with a relatively small return on investment as far as instream values are concerned, although other purposes of a water resource assessment may be achieved with economy.

The primary advantage of this strategy is that it raises the issue of instream flow needs and informs the public of the conflict between instream and offstream water use, and it highlights the potential impacts on instream values resulting from development. Considering the building pressure to develop the west's resources, it is important that instream values be accounted for. This strategy's future effectiveness depends on how forcefully instream values are weighed in water resource assessments related to development.

It is unlikely that a § 13 study would be undertaken in California since the resources that § 13 studies usually examine, such as coal and oil shale, do not exist to any significant degree in California. Also, conversations with personnel from the California Department of Water Resources indicate that Level B planning probably would not be undertaken in California because similar planning on the State level has already been completed.

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FEDERAL AID FUNDING TO PURCHASE STORAGE

I. Identification

The Federal Aid in Fish and Wildlife Restoration Programs are supported by a manufacturer's excise tax on certain items of fishing gear, sporting arms and ammunition. These taxes collected by the United States Treasurer are appropriated to the Fish and Wildlife Service which distributes these monies to the states and territories for carrying out the intent of the Federal Aid Programs. Under the Federal Aid in Sport Fish Restoration Act (P.L. 81-681), known as the Dingell-Johnson Act, funds may be appropriated to the States for the purchase of reservoir storage which, ultimately, could be used as a means of reserving instream flows. Other legislation, which combined with the Dingell-Johnson Act, forms the legal basis for Federal Aid Programs, includes the Federal Aid in Wildlife Restoration Act, known as the Pitman-Robertson Act (P.L. 75-415), and the Anadromous Fish Conservation Act (P.L. 89-304).

II. Application

This strategy may be utilized when the California Department of Fish and Game determines that the fish and wildlife resources below a reservoir might not be preserved or enhanced except by the purchase of reservoir storage. Parties participating in the implementation of this strategy would be the California Department of Fish and Game and the regional FWS Federal Aid office in Portland.

The process whereby a state applies for Federal Aid funding is described in the 1973 revision of the Federal Aid Manual. The first document submitted by the state is the Application for Federal Assistance (AFA), which outlines the basic plan for the proposed project. Information pertinent to the environmental and socio-economic impacts of the project as well as budget information and forecasted cash needs are also included in this application. The most important part of the application is the Program Narrative which must address:

- Needs or objectives of the project
- Expected benefits or results
- Approach of the project
- Project location
- Related Federal projects

The AFA in combination with any supporting documents provides the basis for any decision made by the Federal Aid Office. If the proposed project is in accordance with specifications of the Federal Aid Program, a Project Agreement is issued. The Project Agreement outlines the period of agreement between the state and the U.S. government and the respective cost share of each entity during the period of development. Care must be taken that matching funds come from state sources; a project cannot be approved if it depends upon another Federal program for its matching funds.

Costs are incurred by the state and Federal governments in the implementation of this strategy. Prior to submitting an AFA, the state must expend funds to determine which streams are in need of increased flows. Additional costs

are borne by the state in revising AFA's which the Federal Aid office determines to be incomplete or insufficiently detailed.

III. Illustration

Federal Aid monies have not yet been used in California to purchase reservoir storage for instream flows, so an example from Utah is cited here to illustrate the utility of this strategy. Long Park Reservoir Project, operated by the Sheep Creek Irrigation Company, will be located on Sheep Creek in the Ashley National Forest within Dagget County, Utah. Sheep Creek is a feeder of Flaming Gorge Reservoir operated by the Bureau of Reclamation. A clearing permit was secured from the Forest Service and elimination of trees from the reservoir site was completed in the spring of 1977. Construction of the reservoir began in October 1977 with an estimated completion date of October 1978. At the present time, the Sheep Creek Irrigation Company acquires water from four high mountain impoundments -- Daggett, Tamarack, Jesson and Spirit Creek between the site of the proposed Long Park Reservoir and the backwater of Flaming Gorge Reservoir.

In its upper and middle reaches, Sheep Creek is a narrow stream located in a constricted canyon. In its lowermost three miles, Sheep Creek Canyon expands in its course toward Flaming Gorge Reservoir. This reach sustains the spawning of rainbow and brown trout which emerge from the reservoir in the months of April (rainbow) and October and November (brown). In past years, to secure adequate storage for irrigation needs, the operating schedules of the four high mountain reservoirs stipulated that flows would not be passed in Sheep Creek during the months of spring run-off storage or during the fall non-irrigation months. Therefore, the spawning of rainbow and brown trout was hindered in the lower 3 to to 4 miles of Sheep Creek.

In 1974, the Utah Division of Wildlife Resources (DWR) was notified that planning had been undertaken by the Sheep Creek Irrigation Division and the Soil Conservation Service for the proposed 13,700 acre-foot Long Park Reservoir. On June 14, 1976, the DWR submitted an AFA to the Fish and Wildlife Service. In the Narrative Statement of this application, the DWR made the following proposals:

- Purchase three of the four high mountain lakes from the irrigation company so that these impoundments could be stabilized
- Purchase a 3,000 acre-foot conservation pool to maintain a trout fishery in the new reservoir
- Purchase 720 acre-feet of water which could be bypassed at the Long Park Reservoir Diversion Dam to enhance the fishery habitat in the lower four miles of Sheep Creek.

According to the agreement between Sheep Creek Irrigation Company and the Division of Wildlife Resources, no water will be diverted from Sheep Creek between December 1 and March 31; however, from the 720 acre-feet of active storage acquired, 4 cfs will be bypassed each spring from the Lower Sheep Creek Diversion Dam for the first 30 days after water from Sheep Creek is diverted to Long Park Reservoir, and 4 cfs will bypass this diversion dam between October 1 and December 1. These releases are intended to enhance the spawning habitat of Lower Sheep Creek. The DWR has also reported that, if these flows result in improved spawning, channel improvement and riparian revegetation will be carried out in this reach.

On June 30, 1976, the FWS issued a Project Agreement wherein funding in the amount of 75% of project costs or $272,790 was supplied to the DWR for the Long Park Reservoir Project. These funds were to be administered in accordance with the Federal Aid in Sport Fish Restoration Act and used for the purchase of water rights in the three high mountain lakes and Long Park Reservoir and to provide for bypass flows at the diversion to Long Park Reservoir.

As indicated by the two-week "turn-around" time between DWR's submission of the AFA and the issuance of an FWS Project Agreement, an AFA thoroughly prepared in accordance with Federal Aid Manual Instructions will ensure timely processing of an application. The critical points in the decision-making process for this strategy are to be found during the State's preparation of the AFA. The successful acquisition of Federal Aid funding is dependent upon:

- Sufficient documentation of the AFA for the proposed project
- Adequate performance in Federal Aid-funded projects which are in progress.

In the case of Long Park Reservoir, the major cost incurred by the State was the 25% share ($90,930) of project costs.

IV. Evaluation

This strategy has not been implemented in the past in California and probably will not be in the future. The California Department of Fish and Game has a policy of not purchasing water rights for instream needs. Their position is that the public owns the waters of the State and, therefore, public funds should not be used to purchase water. They prefer to obtain instream flow reservations either through direct appropriation (see strategy entitled State Appropriation of Instream Flow) or through the imposition of conditions on water use permits (see strategy entitled State Discretionary Water Permit Authority).

If the California Department of Fish and Game does change its policy, this strategy can be effective. California would have to raise their 25% share of projected costs. Water rights are expensive, yet if California uses only a small portion of its approximately $4.5 million in Federal aid funds, significant amounts of water could be purchased. Federal Aid Office personnel in Portland, Oregon have indicated that approval would probably be given for the use of a portion of these funds for the purchase of reservoir storage.

Furthermore, if California changes its present position it must avoid mistakes other states have made which have curtailed its effectiveness. Conversations with officials of the Federal Aid Program indicate that, in the past, delays in project funding have resulted from inadequate documentation of Project Agreements. These agreements between the state and the affected irrigation districts were often vague in delineating post-project responsibilities. Failure by the state to submit reports and vouchers for the previous year's work within the 90-day period specified by Federal Management Circular 74-7 also delayed the processing of an AFA for impending work.

Another impediment to the use of the strategy has been state violation of the Rules and Regulations of the Federal Aid Program (Section 80.5). States become ineligible for Federal Aid funding if funds or real property acquired through this source pass from control of the state fish and game agency or are

used for purposes not specified in the Project Agreement. State eligibility is restored when misused funding is compensated or the appropriated property or an equivalent is restored. Adherence to the administrative guidelines of the Federal Aid Programs will improve this strategy's effectiveness.

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FEDERAL RESERVOIR CONSTRUCTION AND ENLARGEMENT

I. Identification

This strategy involves the construction of new dams and reservoirs large enough in capacity to expressly provide for instream flow reservations, or the enlargement of existing dams and reservoirs for this purpose. The legal basis for this strategy is implied in the legislation granting authority to construction agencies to construct and modify reservoir projects. The Bureau of Reclamation derives this power from the Reclamation Act of 1902 and subsequent amendments, especially the important 1939 amendments. The Corps of Engineers is granted construction authority by the various Rivers and Harbor Acts, and the Soil Conservation Service operates under the Small Watershed Protection Act. More specific statutory authority to provide reservoir storage capacity expressly for regulation of streamflow for fish and wildlife needs is contained in Section 102 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500).

The Anadromous Fish Conservation Act authorizes the Bureau, Corps, Department of Agriculture, and the states to construct dams and reservoirs solely for the purpose of conserving, protecting, and enhancing anadromous fish if the Secretary of Interior deems this action necessary. The Fish and Wildlife Coordination Act provides a mechanism through which the Fish and Wildlife Service and state fish and game agencies can implement this strategy.

II. Application

This strategy would be applied when construction agencies first begin planning to construct a new dam or enlarge an existing one. No Federal construction agency, except under the Anadromous Fish Conservation Act, is authorized to build a reservoir solely for fish and wildlife purposes; however, the protection or enhancement of fish and wildlife resources could be made a very important project purpose in a multi-purpose project. The FWS and California Department of Fish and Game could promote fish and wildlife conservation to the extent that additional storage capacity specifically to sustain and reserve minimum instream flows would be planned. If during initial project planning these agencies learn that planned storage volumes will be insufficient to provide adequate instream flows would be planned (also see strategy entitled State Allocation of Reservoir Space). If during initial project planning these agencies learn that planned storage volumes will be insufficient to provide adequate instream flows, they may recommend a larger dam and reservoir and have the additional costs allocated to fish and wildlife benefits.

When construction agencies enlarge existing reservoir projects, they may do so solely for fish and wildlife purposes or for a number of reasons including the preservation or development of fish and wildlife resources. The fish and game agencies would have to convince the construction agencies of the advisability of enlarging a reservoir to ensure reserving instream flows. Relating a minimum flow regime to the storage capacity necessary to its maintenance may require hydrological data and expertise that is difficult for fish and game interests to acquire. Also, fish and wildlife agencies must convince the construction agencies of the economic benefits of this action. The construction agencies are an important beneficiary of this strategy because they can claim valuable economic benefits in constructing larger dams or enlarging dams for fish and wildlife purposes, possibly improving the economic justification of a reservoir project. Marshalling public opinion can be an important component of this

strategy. The FWS and the California Department of Fish and Game can cooperate with conservation organizations and sportsmen's clubs in their negotiations with the construction agencies.

In implementing this strategy, the fish and game agencies must decide which proposed or existing reservoir projects they should investigate for which instream flow and related storage recommendations are most needed. This decision is predicated on the importance of protecting a particular ecological resource and the likelihood that construction agencies will accept and implement the recommendations. The decisionmaking involved is very related to the application of other instream flow strategies (see strategies entitled State-Federal Flow Requests Made Early, State-Federal Combined Storage and Flow Requests, and State-Federal Interagency Consultations). The implementation of this strategy also depends on decisionmaking by Congress which must authorize the construction or enlargement of dams and reservoirs.

The total costs could be substantial in implementing this strategy. Costs would be incurred as always in conducting stream investigations to justify the inclusion of flow reservations. In addition, however, developing the hydrological basis for increasing the reservoir capacity to sustain the flow reservation will impose significant study cost.

III. Illustration

This strategy has not been implemented in California; therefore an illustration is used from Washington to demonstrate its utility. The proposed enlargement of Bumping Lake, a reservoir located on the Yakima River, Washington, provides an illustration of this strategy. The Yakima River had supported a major run of salmon, but with the impoundment of the river during the 1930's, this run was all but destroyed. The enlargement of Bumping Lake was planned to rehabilitate the salmon run.

Consideration has been given to enlarging Bumping Lake since 1939 when the Roza Diversion was completed. Originally, the planned enlargement was primarily for increased irrigation storage, but enlarging the lake for this purpose could not be justified economically and, therefore, economic benefits had to be derived elsewhere. A complication was that in the mid-1950's the local irrigators were not enthusiastic over the proposed enlargement because they believed the stored water would be too expensive. For these reasons, the BR decided to allocate substantial storage to other purposes. Influenced by the FWS and the recent passage (in 1958) of the Fish and Wildlife Coordination Act, the Bureau proposed a 458,000 acre-foot reservoir with 324,000 acre-feet allocated to fishery enhancement and only 100,000 acre-feet for irrigation. The Washington Department of Game and the BR are presently negotiating over an optimum storage release schedule to provide for the instream flow needs of salmon.

The decisionmaking involved in implementing this course of action centers around the FWS decision to encourage the BR to enlarge the reservoir for fishery enhancement and the BR's favorable decision largely due to the added economic benefits it could claim to help justify the action. The costs, so far, have been those generally incurred in planning a project modification and have not been substantial. Greater costs may accrue, though, due to delay in construction caused by local opposition. Additional time may be spent in pacifying opposition and in the Congressional authorization process.

Irrigators along the Yakima River oppose allocating a large amount of storage for instream use, and threaten to divert fishery enhancement flows. To guard against this possibility, the Washington Department of Game has suggested that streamflow gages be installed along the river and irrigators be contractually bound to compensate losses to the ecosystem caused by illegal diversion.

IV. Evaluation

To the present, no reservoir west of the Mississippi River has been built solely for fishery purposes under the Anadromous Fish Conservation Act. Federal construction agencies, though, can include fish and wildlife conservation as a project purpose and can provide substantial reservoir storage to sustain flow releases so as to further this purpose. This approach has been more common in recent years, partially because the construction agencies can maximize their benefit claims by adding to the project purposes, and because of recent environmental legislation and increased environmental consciousness.

To successfully implement this strategy, the FWS and California Department of Fish and Game must participate early in the planning process with the construction agency and fully understand the allocation of projected reservoir storage. A basis for coordination with construction agencies is provided by the Fish and Wildlife Coordination Act (see strategies entitled State-Federal Combined Storage Flow Requests, State-Federal Flow Request Made Early, and State-Federal Interagency Consultations). Although the construction agencies are under no legal or institutional compulsion to adopt the course of action advocated by the fish and game interests, conservation agencies and their private-sector allies are sometimes convincing in bargaining for greater reservoir storage capacity to ensure reserving instream flows. Their persuasiveness depends a good deal on the scope of their knowledge of the hydrological and biological conditions surrounding a planned or existing dam and reservoir project. Although this strategy has not been implemented in California, Federal construction agencies and state fish and game agencies generally have coordinated more effectively in recent years, thus offering increased promise for this strategy.

Once a construction agency commits itself to build a new dam or enlarge an existing one for purposes including the reservation of instream flows, such a commitment is embodied in authorizing legislation passed by Congress. This legislative action is a primary advantage of this strategy because it has the force of law and expresses Congressional intent to protect instream flows.

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WATER RESOURCE MANAGEMENT

STATE WATER RIGHTS RECORDS ANALYZED

I. Identification

This strategy involves locating and analyzing the water rights records for a particular stream as part of the process for securing instream flows. The strategy itself will not ensure an instream flow,but it can be used by the Fish and Wildlfie Service and by the California Department of Fish and Game in formulating tactics when negotiating with construction or operating agencies for minimum instream flows. Any interested party could find this strategy useful in deciding what tactics or further strategy would be appropriate to obtain instream flows in a particular stream.

Several legislative acts have been in enacted in California concerning the distribution of water rights such as Cal. Water Code § 5100 et. seq. and § 2500 et. seq. Negotiations between the FWS and California Department of Fish and Game and the Federal construction agencies take place in accordance with the Fish and Wildlife Coordination Act. These statutes are the legal basis of this strategy.

II. Application

The California Department of Fish and Game, the FWS or any conservation organization can employ this strategy. It is applicable primarily in two situations; when a concerned party seeks to require minimum instream flows; and when the California Department of Fish and Game or FWS is bargaining with a Federal construction or operating agency for reservoir releases sufficient to maintain prescribed minimum flows.

Knowledge of the water rights established along a stream reach will aid in selecting the best course of action to reserve instream flows there. For example, if normal streamflows are fully appropriated, a strategy such as filing a junior water right would not be effective, but a strategy such as direct purchase of water rights would be. In contrast, if a stream is not entirely appropriated, an administrative appropriation of instream flow may be applicable.

The California Department of Fish and Game or the FWS can bargain more intelligently with the construction or operating agency for prescribed releases from a reservoir if the extent, location and ownership of water rights established below the dam are known. For instance, if the fishery in a certain stream reach required a minimum 15-cfs instream flow, then sufficient reservoir releases should be prescribed so that 15 cfs will remain after all water rights throughout the stream reach have been exercised. Therefore, knowledge of the existing water rights is essential. With this knowledge, a fish and game agency could tie an instream flow recommendation to an existing downstream water right. This bargaining tactic may be useful as a last resort toward reserving an instream flow where protection of fish and wildlife is not recognized legally as a beneficial use of water.

The primary responsibility for administering water rights in California rests with the California Water Resources Control Board. The permits they issue to water users are a matter of public record. There is no charge for examining these records.

III. Illustration

This strategy has not been applied in California; therefore, an illustration is used from Colorado to demonstrate its utility. Knowledge of a downstream water right enabled a useful tactic in reserving an instream flow in Clear Creek, Colorado below Georgetown Lake. In May 1969, the FWS recommended a minimum bypass flow of 20 cfs or the inflow to the reservoir, whichever was less. In part, this recommendation was based upon the knowledge of established downstream water rights of 20 cfs. This knowledge was gained through discussions with the State Engineer. A bypass flow of 20 cfs was acceptable to the project licensee, and it was incorporated into the BLM lease of the project. This minimum low flow has usually been maintained, resulting in the preservation of the downstream fishery.

This case illustrates the strategy in a typical situation where the State and Federal fish and game agencies bargain with a Federal permit or construction agency for a minimum release from a reservoir. It does not, however, represent an optimum application of the strategy since the flow recommendation merely uses the water right as a crutch; apparently, no analysis of inflows and diversions along the affected stream reach was attempted. The important decision points in applying the strategy in this situation are already institutionalized within the bargaining process. Relatively little cost is involved to gain and apply knowledge of water rights as a tactic in the bargaining process.

IV. Evaluation

This strategy had no demonstrated utility in California. It can be argued that flows would be released from a reservoir to satisfy downstream rights regardless of an agreement between the FWS and Federal construction, operating or permit agency. However, it is advantageous to obtain a formal agreement because the downstream rights eventually might be reduced or terminated. An obvious disadvantage of this tactic, though, is that the flow released to satisfy downstream rights may not be the optimum flow for fish and wildlife purposes.

This strategy is ineffective if used by itself. A knowledge of the water rights situation along a certain stream will not result in an instream flow reservation unless this knowledge is used in conjunction with another strategy.

This strategy could effectively be used in conjunction with several other strategies which employ California's permit system. When the California Department of Fish and Game examines the needs of the downstream fishery it would be helpful to analyze existing diversionary uses.

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STATE-FEDERAL FLOW REQUESTS MADE EARLY

I. Identification

To offer timely flow recommendations, the Fish and Wildlife Service and California Department of Fish and Game must be involved in the planning process when Federal agencies, such as the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service, plan the construction of dams and reservoirs. Recommendations that are timely, i.e., made prior to project construction, have a greater chance of acceptance and implementation than those made during or after construction. The legal basis of this strategy is the Fish and Wildlife Coordination Act of 1958 and the planning procedures adopted by the Federal construction agencies.

II. Application

This strategy is applicable when any Federal construction agency is planning a reservoir, particularly in the earlier phases of planning before design and cost options are foreclosed. Also, when the Federal Energy Regulatory Commission is considering licensing or relicensing a dam and reservoir project, or when the Bureau of Land Management or Forest Service is in the process of issuing a permit to construct a dam on Federal lands, this strategy would apply. The role of these agencies, however, is treated separately (see strategy entitled Federal License and Permit Stipulations). The Bureau of Indian Affairs manages reservoirs, but reservoirs under its management are constructed by the BR.

As provided by the Fish and Wildlife Coordination Act of 1958, the FWS and the California Department of Fish and Game would pursue this strategy. Although it would not be available directly to private parties or public interest organizations, they could play an important role in exerting pressure on the construction agency to accept the fish and wildlife agencies' recommendations.

To apply the strategy, the fish and game agencies must conduct a timely investigation to formulate instream flow recommendations. Application of the strategy is contingent upon prompt notification by the construction agencies of the initiation of project planning. Each construction agency has promulated procedures to provide for early notification and cooperation with the FWS and the California Department of Fish and Game.

A recent letter from the Commissioner of the BR to the Bureau's Regional Directors ordered them to notify the FWS of the initiation of project planning and provide the FWS with the opportunity to participate in the formulation and evaluation of project plans and to present reports to the BR, including recommendations relating to fish and wildlife aspects of the project plan. The Corps issued procedures dated 15 August 1973 (to be updated in 1978) which require each District Engineer to provide the Federal and state fish and game agencies with advance information on the studies underway in his planning program; notify them of the initiation of the project investigation; continue liaison, including conferences, throughout the investigation; and obtain the recommendations of the fish and wildlife agencies. The SCS has the least stringent requirements for fish and wildlife agency input. Still, their procedures do encourage the Federal and state fish and game agencies to participate actively in project formulation and to incorporate needed measures in each project to the maximum extent feasible.

Once the Federal and state fish and game agencies have been notified of a project plan and brought into the planning process, they must initiate an investigation to develop timely recommendations. Although conducting investigations and formulating instream flow recommendations are usually time-consuming and expensive tasks, an insistence on timely performance could result in additional costs because of the lack of flexibility available to the field office administrator in allocating time of personnel. Also, earlier efforts can be wasted because preliminary construction plans are often changed or abandoned later on.

III. Illustration

Historically, the San Joaquin River has contained substantial anadromous fish resources; however, water resource development along the river gradually eliminated the fall salmon runs. In order to rehabilitate these resources, the California Department of Fish and Game requested that substantial releases be made from the Auburn Dam Project.

The California Department of Fish and Game requested that the Water Resources Control Board grant a permit to the Auburn Dam Project requiring that the BR perform studies of the fishery resources so that Congress could have the results prior to authorization. The Board granted a permit to the Bureau; however, the Board conditioned the permit so that at any future date additional conditions could be stipulated to rehabilitate and maintain the anadromous fishery of the river system.

In 1971 the Board, upon the recommendation of the Califonria Department of Fish and Game, stipulated that 1,250 cfs be maintained below Auburn Dam from 15 October to 14 July and 800 cfs from 15 July to 14 October.

Flows to the present time (1978) have been maintained. The cost of this strategy included the usual cost of performing detailed studies of the instream flow needs of the fishery.

IV. Evaluation

As illustrated by the Auburn Dam Project, this strategy has apparently displayed significant past utility. An Enviro Control study of 109 flow recommendations in nine western states revealed that instream flow recommendations made prior to project construction have resulted in greater acceptance than recommendations made during or after construction.

In judging the future effectiveness of the strategy, a number of factors must be considered. The strategy is applicable only when a Federal construction agency is building or modifying a project. Such construction will probably decrease in the future when compared to the state of construction in the 20 years after World War II. Users of this strategy are limited to the FWS and California Department of Fish and Game although private individuals or public interest groups can exert some influence with the construction agencies on behalf of the recommendations by the conservation agencies.

The effectiveness of this strategy depends, in large part, on the construction agencies' close adherence to their own adopted procedures concerning early coordination of fish and wildlife agencies on project planning matters.

According to FWS personnel, construction agencies have been following these procedures in California, especially in recent years. Even if the Federal and state fish and game agencies are informed of a project being planned and their inputs are invited, they must decide which projects to investigate in depth where a considerable expenditure of limited personnel and funds would be warranted. In addition, to make timely investigations and recommendations, the state and Federal fish and game agencies would be deprived of some flexibility in budgeting and scheduling. Finally, although a timely flow recommendation enjoys a better chance of acceptance, there is no assurance that such a recommendation will not be rejected on some other basis such as the reasonableness of the flow amounts requested.

Despite these constraints, this strategy does have some definite advantages. Offering flow recommendations is already part of an institutionalized process which has been ongoing for 30 years between the fish and wildlife agencies and the Federal construction agencies. This process has a firm legal basis and should be improved in the future.

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STATE-FEDERAL FLOW REQUESTS MADE SPECIFIC

I. Identification

Specifying instream flow requirements for a particular stream reach or tributary below a dam and reservoir, and monitoring actual instream flows there to ensure that downstream resource values are protected, involves detailed on-site investigations by the fish and game agency and subsequent stream gaging. Studies such as transect surveys must be performed at downstream locations selected so as to determine the instream flow needs in specific stream reaches below the dam site. Recommendations would then be offered to the construction agency specifying needed flow releases which, if accepted, would be incorporated into the reservoir's operating criteria. Gaging stations, located within the specific downstream reaches, would determine the sufficiency of the interagency consultative process as provided for by the Fish and Wildlife Coordination Act.

II. Application

This strategy would be applied when the fishery, rookery or other biotic resource within a reach or tributary remotely downstream from a dam and reservoir project is predicted to be, or is already, adversely affected by project flows. Often, a downstream fishery is threatened by low flows even though a required minimum flow is discharged upstream at the dam. Stream diversions and seepage from the stream channel often are responsible for the diminution of the original flow. Also, fishery flows required directly below the dam may be insufficient within a more remote reach or tributary downstream to satisfy localized fish and wildlife habitat requirements. In both cases, the specification of an instream flow requirement at a particular downstream site in addition to, or in place of a project flow release, and the installation of a streamflow gage will facilitate suitable flows in the remote stream reach or tributary. Furthermore, exact requirements supported by careful field investigations will be more persuasive in seeking any flow reservation.

Advocates of, or participants in this strategy would be the California Department of Fish and Game, the FWS, and the State Water Resources Control Board. Public interest group aware of localized fish and wildlife needs and stream conditions could also participate in applying this strategy. Implementation of the strategy requires that instream flow recommendations be provided to the construction or permit agncy during the appropriate planning state (see strategy entitled State-Federal Flow Requests Made Early). For existing projects, reauthorization or relicensing proceedings or administrative reassignment of reservoir storage could be instituted to reserve needed flows and provide gaging stations (see strategis entitled State-Federal Combined Storage and Flow Requests, Federal License and Permit Stipulations, and Federal Reauthorization of Projects).

The principal costs of applying this strategy would result from detailed instream flow field studies performed by the involved fish and wildlife agencies at downstream sites. Installation and maintenance of streamflow gages in the designated stream reaches will account for additional costs.

II. Illustration

Auburn Dam will be part of the Bureau of Reclamation's Central Valley Project. It will be located on the American River immediately upstream from the Folsom Reservoir. The lower 23 miles of the American River is the fifth most important salmon spawning area in California. The California Department of Fish and Game and the Fish and Wildlife Service are attempting to protect the entire reach of the American River from Auburn Dam downstream to the mouth.

The State Water Resources Control Board held a hearing in 1971 to determine what flows should be maintained in the 23-mile reach. The Water Resources Control Board accepted the recommendation of the fishery agencies that 1,250 cfs be maintained in the entire reach from 15 October to 14 July and 800 cfs from 15 July to 14 October. This release schedule, which was included as a condition in the project's permit, was far greater than the flows agreed to 15 years earlier when the Folsom-Nimbus Project was constructed.

So far flows have been maintained in the entire reach. This success, though, has partially occurred because the Folsom South Canal, which is to divert water from Folsom Reservoir, has not yet been built. The Bureau of Reclamation has challenged the authority of the State Water Resources Control Board to place conditions on Bureau projects. The Bureau has successfully challenged this authority in the case of U.S. v. State of California; however, the issue probably will be finally resolved by the United States Supreme Court which agreed to hear the case. If the Court holds in favor of the BR, this illustration might prove inapplicable in 1978.

The primary costs involved in implementing this strategy were the time and monies expended to conduct the studies by the California Department of Fish and Game. These studies resulted in recommendations which were submitted to the Water Resources Control Board.

IV. Evaluation

As demonstrated by the above illustration, this strategy has shown some success in California. For a few reservoir projects, the California Department of Fish and Game and FWS have been successful in ensuring that project sponsors release sufficient flows to maintain a fishery in a downstream reach. Adequate releases are made to satisfy both the needs of the fishery and to fulfill the currently valid water rights from the dam to the stream's mouth.

In addition, the project sponsors are held responsible for monitoring downstream flows to ensure that downstream users do not over-appropriate. Subsequent diversions would be subject to permit conditions imposed by the State Water Resources Control Board to guarantee that flows for fish and wildlife are maintained.

Despite its limited success, constraints have existed on the past use of this strategy. A major constraint has been the usual inadequacy on instream flow studies. Historically, flow recommendations were made for the entire reach below the project to a downstream confluence with an identifiable tributary or a main stem river without investigating the requirements of intermediate stream segments. Little attention was paid to the effects of irrigation diversions or return flows. Likewise, consideration of tributary inflows and groundwater recharge was overlooked in the evaluation of flow needs. These variables are

receiving greater attention in contemporary flow studies, although the costs associated with such detailed investigations are significantly greater. They are justifiable where high-value fish and wildlife resources are at stake.

An added constraint in the future will be the costs of the installation and maintenance of streamflow gages which are necessary to fully implement this strategy. Conversations with the United States Geological Survey indicate that an assumption of gaging costs by a construction agency is determined on a case by case basis. In some instances, the construction agency and the fish and game agency will share these costs; otherwise, either one or the other will assume the total costs. The cost of installing a gage can range from $15,000 to $40,000; approximate annual operation and maintenance costs can be $4,000.

The future effectiveness of this strategy will be enhanced by improved flow study methodologies. The ability to document seasonal instream flow needs for a specific stream reach lends authenticity and credibility to the fish and wildlife agency's bargaining position, thus increasing the likelihood of a flow reservation. On occasion, the ability to quantify the instream contribution of tributary inflows and irrigation return flows could result in a downward adjustment of project releases, thereby preserving water for other beneficial uses.

The greatest potential constraint on the future effectiveness of this strategy is the final outcome of U.S. v. State of California. If Federal agencies are not bound by State permit conditions, then the potential success of this strategy would be seriously jeopardized.

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STATE-FEDERAL COMBINED STORAGE AND FLOW REQUESTS

I. Identification

When recommending flow releases from proposed or existing reservoir projects, the Fish and Wildlife Service and California Department of Fish and Game should base their recommendations in part on information about storage capacity and projected sales of stored water. The strategy thus embraces simultaneous negotiations for downstream flows and surplus storage capacity in the reservoir sufficient to guarantee the flows. The legal basis of this strategy is the Fish and Wildlife Coordination Act which provides for consultation between State and Federal fish and game interests and the Federal construction agencies.

II. Application

This strategy is applicable in two situations: when a project is being planned by a Federal construction agency and when storage space becomes available in either a planned or existing reservoir. The parties to be involved in this strategy are primarily the FWS and the California Department of Fish and Game. They would apply this strategy in their dealings with Federal construction and operating agencies over planned and existing reservoir projects. Support for this strategy can be generated from local residents, conservancy districts, sportsmen, and environmental organizations.

Most operating reservoirs in the west contain either unobligated, unutilized or underutilized storage. "Unobligated storage" is reservoir storage which is not contractually obligated to water users although it is bound by legislative intent for particular purposes. "Unutilized storage" is contractually obligated for future or deferred use, whereas "underutilized storage" is currently not in use for a particular purpose although contractually obligated for the purpose. Knowledge of unutilized, unobligated and underutilized storage can lead to its interim or permanent allocation for minimum flow releases to satisfy instream flow needs of fish and wildlife. Even without producing an outright allocation, such knowledge can certainly strengthen the bargaining position of fish and wildlife interests seeking instream flow reservations.

Early in the project planning phase, the construction agencies should be requested to provide the FWS and state fish and game agencies with information regarding reservoir storage capacity and the projected sale or other commitment of storage. With this data, the fish and game agencies should be able to determine and negotiate for the amount of storage available to ensure minimum instream flows below the reservoir.

During project operation, some storage may become available -- i.e., unobligated, unutilized or underutilized. The FWS and the state fish and game agencies should have cultivated a cooperative arrangement with the Federal construction agencies, requiring notification when reservoir storage space becomes available. With this information, fish and game agencies may decide to recommend the allocation of reservoir storage to reinforce instream flow recommendations if the downstream fishery warrants this extra measure of protection.

The costs involved in implementing this strategy could vary dramatically, depending on the level of cooperation between the fish and game agencies and the Federal construction and operating agencies. If cooperative agreements under the Fish and Wildlife Coordination Act are successfully implemented (see strategy entitled State-Federal Interagency Consultation), then this strategy would not involve substantial costs. If, however, the FWS and the state fish and game agencies are not routinely furnished with information on planned reservoir capacities and anticipated sale of water storage, or information on available storage in existing reservoirs, then significant costs can be incurred in gathering this information.

III. Illustration

Because this strategy has not been implemented in California, an example from Colorado is used to demonstrate the strategy's utility. The Bureau of Reclamation's Dolores Project (McPhee Dam) was authorized in 1968 as part of the Colorado River Storage Project. McPhee Reservoir, which will have a total capacity of about 381,000 acre-feet, will be operated primarily for irrigation, flood control, municipal and industrial water supply, and recreation. In addition, 800 acre-feet have been allocated to fish and wildlife enhancement. At present, the Dolores River is dewatered at many locations due to channelization and mining and agricultural activities. Therefore, the once excellent trout fishery in the Dolores River has been decimated.

When the project was authorized, the BR planned to release only 4 cfs from McPhee Reservoir for fishery purposes. The FWS and Colorado Division of Wildlife did not recommend additional flow releases because to significantly improve the marginal downstream fishery would require substantial releases which the BR probably would not agree to. In the early 1970's the BR decided to redesign the project, switching from a gravity surface-irrigation system to a sprinkler system. This change was made for two reasons; the sprinkler system is more water efficient; the sprinkler system would reduce the salinity of return flows.

This change in project design released 800 acre-feet of reservoir storage for other purposes. This storage could have been used to irrigate more acreage; however, the Conservancy District sponsoring the project realized the benefits of releasing the unobligated storage to reestablish the trout fishery in the river. The BR then asked the FWS and Colorado Division of Wildlife to study the river to determine the flows needed to reestablish the fishery. Using the sag-tape method, FWS and Colorado Division of Wildlife personnel concluded that 78 cfs was an optimum flow, 50 cfs an adequate flow and 20 cfs a survival flow for trout below the proposed dam. Based on these studies the FWS and Colorado Division of Wildlife recommended that the BR release 50 cfs from McPhee Dam. The BR agreed to release 50 cfs during wet years, and 20 cfs during dry years. The terms dry, wet, and normal were not defined.

It is, of course, premature to judge the effectiveness of the prescribed releases since the project has not yet been built. Given the cooperation of the construction agency, the costs of implementing this strategy are not too great. The major cost involves the personnel time to conduct the streamflow study.

IV. Evaluation

This strategy has not demonstrated past utility in California. To a great extent instream flow reservations in California have resulted from the permit process. This process has been generally successful but does not take into account negotiations for storage.

The future effectiveness of this strategy for new projects depends on successfully implementing other strategies, such as achieving interagency coordination under the Fish and Wildlife Coordination Act (see strategy entitled State-Federal Interagency Consultation) and recommending instream flows early in the planning process (see strategy entitled State-Federal Flow Requests Made Early). It is essential that fish and game agencies actively participate in planning reservoir projects and, as in the Dolores Project, are kept informed periodically about the availability of storage in already authorized and operating reservoirs.

The strategy's greatest potential exists when the local sponsoring entity or the construction agency sees the benefits involved in releasing available storage for fishery purposes and brings fishery agencies into the process of planning reservoir releases. In such an instance, the cost of implementing this strategy is not particularly great; however, without cooperation among the agencies involved, the cost could be substantial. For example, a major cost might be incurred by the fish and wildlife agencies in gathering information which could have been provided by the construction and operating agencies. On the other hand, fish and wildlife interests must justify the economics of allocating any available storage for fish and wildlife purposes.

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ENGINEERING ALTERNATIVES

COORDINATED MULTI-RESERVOIR OPERATIONS

I. Identification

The operations of a multi-reservoir system are regulated through an operations manual which specifies the flows to be released in keeping with the stated purposes of each project. The most common purposes for which multi-reservoir systems are operated are flood control, power production, and irrigation.

Coordinated operations of a multi-reservoir system to sustain or elevate minimum flows would require modification of the operations manual. To accomplish this, authorizing or licensing documents for component projects within the system must be modified to include the necessary releases. Modification of Federal projects may require reauthorization or relicensing proceedings (see strategies entitled Federal Reauthorization of Projects and Federal License and Permit Stipulations). At the minimum, an adjustment of flow releases would entail the preparation of a memorandum of agreement between the operators of the system and the fish and wildlife interests. The legal and administrative basis for this strategy is the agency and interagency regulations and procedures governing those agencies operating reservoir systems The Fish and Wildlife Coordination Act is the interagency mechanism.

II. Application

This strategy would be applied where a fishery or other aquatic resource below a dam within a multi-reservoir system could be rehabilitated or enhanced by coordinated releases from the system. Parties involved in the implementation of this strategy are likely to be the FWS, the California Department of Fish and Game and the agency or agencies operating the system. In many instances, the system operator will be a single entity, such as the Bureau of Reclamation operating an irrigation project. Where two or more entities such as the Bureau and the Corps would be responsible for project operations, regulation of the system is often mediated using a memorandum of agreement among the agencies involved. Attempts to secure minimum instream flows by balancing system operations would call for drafting a revised memorandum of agreement.

Upon determining stream flows to be insufficient to sustain the fishery below a dam within the reservoir system, the interested fish and wildlife agency must examine the operating characteristics of the system, especially its flow regimes and its storage capacities (see strategy entitled State-Federal Combined Storage and Flow Requests). Field studies would be performed to establish the flow needs for the affected stream reach. Given the system characteristics and the instream flow needs, the fish and wildlife interests could propose to alter the operations manual and memorandum of agreement to ensure the recommended flows.

Conducting system-wide flow studies will incur the principal costs during the implementation of the strategy. Additional costs will result from presenting a convincing case to the operating agency toward revising the system operations manual and to reauthorization or relicensing proceedings if these become necessary.

III. Illustration

The Shasta-Keswick Reservoir Project is part of the Mammoth Central Valley Project of California. Shasta-Keswick has been operated with other components of the Central Valley Project, such as the Trinity-Lewiston Project, to increase the annual instream flow of the Sacramento River as compared to pre-project conditions. Consequently the fall and winter king salmon runs in the Upper Sacramento River have been maintained.

Although the Shasta-Keswick Project has been operating since 1945, it was not until 1972 that the present flow regime was instituted. This regime is as follows:

January 1 - February 28: 2,600 cfs
March 1 - August 31: 2,300 cfs
September 1 - November 30: 3,900 cfs
December 1 - December 31: 2,600 cfs

Flows can be slightly less during critically dry years. These flows were recommended after detailed studies by the Fish and Wildlife Service and the California Department of Fish and Game. The regime was accepted by the Bureau of Reclamation, the project's sponsor.

In recommending these flows, the fishery agencies studied the hydrological and biological situation throughout the Sacramento - San Joaquin Delta, including release schedules from many water resource projects. The primary cost involved in reserving these flows was time spent on field studies.

IV. Evaluation

Because most of the water resource development in California involves multi-reservoir systems, this strategy is quite common. The Central Valley Project, with its associated units such as the Shasta-Keswick Project, provides a prime example of coordinated multi-reservoir operations for many purposes, including fish and wildlife protection.

Although successful in the past, there are some constraints upon the strategy's utility. A past constraint on the applicability of this strategy for flood control and irrigation projects has been the lack of efficient forecasting methods. Under normal operations, spills were made as necessary in anticipation of needed storage space. The development of a reliable forecasting technique would permit coordination of the system so that storage releases could be made gradually instead of discharging large, habitat damaging increments.

Future utilization of this strategy will increase proportionally as the interest in fish and wildlife habitats increases vis-a-vis project purposes such as flood control, irrigation, and power production. In addition, there are a number of cost constraints which will continue to limit the use of this strategy. The fish and game agencies will incur increasing costs for flow studies which increase in complexity and sophistication as entire multi-reservoir systems are analyzed in greater depth. Hydrologic data requirements and required engineering expertise will demand that fish and wildlife interests acquire the analytical skills of the construction agencies in addition to their

established biological expertise. These constraints, though, do not actually preclude the use of this strategy, especially in view of the receptivity of the Bureau of Reclamation.

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RESERVOIR SEDIMENT STORAGE RELEASES

I. Identification

Releases of yield from sediment reserve storage for augmenting instream flows involve storage space reassignment by the construction or administering agency. Sediment reserve storage space is the portion of reservoir capacity assigned to sedimentation during the economic life of the project. After a project is constructed, the total amount of storage capacity assigned to a sediment reserve will not be needed for many years. This storage, then, can be made available on a long-term interim basis for fish and wildlife protection and other beneficial uses. Such a reassignment is an administrative decision and does not necessitate Congressional reauthorization of the project. The legal and administrative basis of this strategy is the construction or operating agency's statutory authority and administrative regulations authorizing discretionary modifications of operating projects.

II. Application

This strategy will be discussed only as it applies to existing reservoirs. Applying it to proposed projects involves interagency coordination in the planning process (see strategies entitled State-Federal Flow Requests Made Early, State-Federal Combined Storage and Flow Requests, and State-Federal Interagency Consultations). The strategy may be formulated when a proposed or existing reservoir contains unused sediment reserve storage in the active reservoir space lying above the elevation of the lowest dam outlet. Such storage is normally preserved or else drawn down for beneficial uses such as recreation, irrigation or water supply in compliance with operating restrictions. Either the California Department of Fish and Game, Fish and Wildlife Service, or a conservation group could instigate this strategy if it determines that an available yield from the sediment reserve can rehabilitate or improve the fish and wildlife resources downstream from the existing reservoir. Ultimately, the concerned party must convince the construction or administering agency, such as the Bureau of Reclamation or the Corps of Engineers, to reassign a portion of the unused sediment reserve storage space to fish and wildlife purposes.

Implementation of this strategy involves two basic decision points. After reaching a favorable preliminary determination, the concerned party must decide to solicit the construction or administering agency for action to modify project operation and release some yield from the sediment reserve. Then the agency must decide if the desired modification is feasible and agreeable. Because of the controversy that is often associated with preserving instream flows, the construction or administering agency might seek formal Congressional approval.

The costs of this strategy to fish and wildlife interests are dependent on the detail and availability of information concerning the sediment reserve storage and the fish and wildlife resources downstream from the reservoir. The concerned party will need to know the amount, depletion rate, and current interim uses of the sediment reserve. In addition, the probable effects that increased instream flows, due to a certain yield of the reserve, would have on the fish and wildlife resources would have to be ascertained.

III. Illustration

Although no actual illustration in California could be identified, an example of a reservoir in Colorado presently suitable to this strategy can be discussed. Completed in 1963, the Bureau of Reclamation's Paonia Project is located on Muddy Creek in west-central Colorado. The stream below Paonia dam supports trout habitat which would improve significantly if added reservoir releases of relatively clear water could be made.

Because of a projected severe sedimentation problem, a substantial portion (44%) of the active storage capacity of Paonia Reservoir was reserved for sediment accumulation. By the end of 50 and 100 years of reservoir operation, the deposition of sediment is estimated to reduce the active reservoir capacity from 18,150 acre-feet to 14,650 and 10,150 acre-feet, respectively. The Upper Colorado Regional Office of the Bureau has stated verbally that the 8,000 acre-feet of sediment reserve storage might be available for interim use.

In fact, the Bureau, in a project planning report, stated that surplus sediment reserve storage space in Paonia Reservoir would be available for flood control and incidental releases to maintain fish life in the stream below the dam. However, it was also stated that the North Fork Conservancy District could use the 8,000 acre-feet of reserved capacity for irrigation or other beneficial uses until it is required by the United States for one or more of the specified purposes. The BR's Upper Colorado Office confirmed that the conservancy district is utilizing this storage.

Neither the FWS nor the Colorado Division of Wildlife has attempted to secure increased releases from Paonia Reservoir. However, the proposed Grand Mesa Project, which would require the construction of Electric Mountain Reservoir immediately upstream from Paonia Reservoir, will probably enable both organizations to review the Paonia storage situation. Furthermore, Electric Mountain Reservoir should diminish the sediment deposited in Paonia Reservoir, thus freeing some storage capacity for long-term obligations.

IV. Evaluation

Although this strategy apparently has not been implemented in the past, it does appear to have broad application because most reservoirs, especially the newer ones, contain substantial sediment reserve storage capacity in the active storage space. The strategy's future effectiveness is primarily limited by the ability of Federal, state or private fishery interests to:

- Determine that the available interim yield from sediment reserve storage can significantly improve the associated fish and wildlife resources
- Convince the construction or administering agency to reassign and release the surplus water storage for fish and wildlife benefits.

The Corps and Bureau frequently apply the surplus sediment reserve on an ad hoc basis to purposes such as irrigation and municipal-industrial water supply. The user for these purposes is not charged for this water. Thus, it is likely that users of this supplemental water would lobby against its reassignment to fish and wildlife protection. Because of this factor and the reluctance of the construction or operating agency to reassign this storage, FWS and California Department of Fish and Game personnel are not particularly optimistic over the

future effectiveness of this strategy. Also, these agencies indicated that they would rather commit their resources to strategies which achieve more permanent instream flows. Probably the yield from sediment reserve storage space would be reassigned to fish and wildlife purposes only where it is currently unutilized and would significantly improve the downstream resources.

Attempting to ensure releases of sediment reserves requires an examination of existing project records and operations. Because FWS and California Department of Fish and Game field offices direct their efforts towards proposed projects, implementing this strategy would involve an expenditure of personnel time normally not provided for from funds transferred by construction agencies. This is a major constraint upon the future effectiveness of this strategy. Probably the best opportunity to implement the strategy would arise when an existing project is modified or a planned project, such as the Grand Mesa Project, would have an impact upon existing reservoir operations.

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STREAM CHANNELS TO CONVEY STORED WATER

I. Identification

In operating dam and reservoir projects to convey stored water to downstream users, water is either released into the stream and diverted at a point downstream or conveyed directly from the reservoir via a canal or conduit. This strategy is an attempt to have proposed reservoir projects designed without direct conveyance systems at the reservoir so that water can be released into the stream to benefit fish and wildlife, then diverted as far downstream as may be feasible. This strategy can be effectuated through the consultative process stipulated by the Fish and Wildlife Coordination Act (FWCA).

The legal basis for this strategy is greatly strengthened in California by California Constitution Article 10, Section 2. Under this Constitutional provision, the use, method of use, and method of diversion of water must be reasonable, and water resources of the State must "be put to beneficial use to the fullest extent of which they are capable." On the other hand, the California State Supreme Court ruled in Environmental Defense Fund v. East Bay Municipal Utility District, No. 23422 Cal. (Decided Dec. 20, 1977), that State law could not be used "to determine a matter within the authority of the federal agency." Utilization of the Constitutional provision, therefore, is restricted in its application to State and private water resource projects.

II. Application

As provided by the Fish and Wildlife Coordination Act (and California Constitution Article 10, Section 2), the Fish and Wildlife Service and California Department of Fish and Game conduct investigations of sites proposed for reservoir projects, then formulate and present recommendations to the construction agencies and the California Water Resources Control Board concerning fish and wildlife preservation or enhancement. If, as part of their investigations, the FWS and State agencies determine that a reservoir conveyance system may damage the downstream fishery or other biotic resources, they might recommend that such a system be modified. They could draw support from local interest groups and users of the resource to give greater force to such a recommendation.

In conducting their project investigations, the FWS and California Department of Fish and Game are provided with information by the sponsoring agencies. Any information regarding proposed conveyance systems should be sought at the outset because a recommendation to modify or not build a conveyance system must be made early in the planning process because detailed engineering and planning are involved, construction agencies and permit applicants would resist a change of plans after spending time and money to develop them. Once the construction begins, a sponsoring agency almost assuredly would not stop construction solely on the recommendation of fish and wildlife interests.

III. Illustration

This strategy has not been implemented in California; therefore, an illustration is used from Wyoming to demonstrate its potential utility. In 1974, the Powder River Reservoir Corporation filed for a BLM right-of-way permit to flood

certain Federally owned lands for the construction of Middle Fork Reservoir. The proposed reservoir will supply water for coal-related industrial development and, to a lesser extent, irrigation. As proposed, water would be conveyed from the reservoir through a canal system to meet these demands.

In 1976 at the request of the BLM, the FWS and Wyoming Game and Fish Department responded to the proposal. After joint field surveys were conducted, a report was submitted by the FWS to the BLM on March 5, 1976. The FWS recommended a minimum instantaneous release of 35 to 40 cfs during the non-irrigation season to develop a good-quality tailwater and downstream fishery. The recommended flow would approximate the historical average winter flow. Without these releases the existing fishery would be seriously curtailed.

The FWS recommended that the only practical way to realize a winter release of this magnitude without destroying the industrial water purpose of the proposed project would be to convey the industrial water down the existing Middle Fork channel to a downstream point of diversion 4.7 miles below the proposed dam. The FWS had indicated that the proposed modification would not result in additional construction.

In late 1977 the planned construction of Middle Fork Reservoir was delayed until the Department of the Interior's solicitor could determine if a right-of-way permit could be granted by the BLM, because the Powder River Reservoir Corporation had not adequately specified the use of the reservoir storage water. If a permit was to be granted, the Secretary of the Interior might require that the permittee provide for storage releases sufficient to meet instream flow needs below the dam. It was expected that a decision would be made on the right-of-way permit sometime in February 1978.

IV. Evaluation

This strategy, as discussed, has not been applied in California. However, in the recent related court case (Environmental Defense Fund v. East Bay Municipal Utility District) the plaintiffs argued, on the basis of California Constitution Article 10, Section 2, that water could be allowed to flow down the Lower American River from the Auburn-Folsom South Unit, and then be diverted by East Bay Municipal District "just as economically as from the diversion point actually closer." Delivery of the water, however, was contracted by East Bay Municipal Utility District with the Bureau of Reclamation and, therefore, according to the California Supreme Court, State law could not be used "to determine a matter within the authority of the federal agency."

Although unsuccessfully contested, this court case did demonstrate the awareness among fish and wildlife interests of this strategy's potential effectiveness. Several severe constraints, though, must be weighed in judging future effectiveness. Reservoir conveyance systems usually occur as a function of project purpose or engineering necessity. Single-purpose power and municipal supply projects most frequently divert water directly from the reservoir. Most offstream appropriators seek gravity flow delivery by conduit or canal to minimize pumping costs; sound engineering judgment and ordinary cost saving considerations may demand direct conveyance from the reservoir. Since conveyance structures are costly, construction agencies and permit applicants normally would maximize the use of the stream channel, subject to trade-off cost factors

such as high energy use to deliver water by pumping instead of gravity. As evidenced in the Middle Fork Reservoir case, the burden will be on the FWS and the California Department of Fish and Game to justify their recommendation from a cost and engineering standpoint, taking the value of the threatened resource into account in a cost/benefit analysis.

Investigating a proposed project and formulating recommendations, pursuant to the FWCA, usually has required substantial time and money. To implement this particular strategy may incur significant additional costs in performing detailed studies to defend a recommendation to modify the reservoir conveyance system. In the case of the Middle Fork Reservoir, the required engineering expertise and additional study cost was atypically low because the cost trade-offs were easily derived.

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U. S. Department of the Interior

Fish and Wildlife Service

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.